



Harmful Algal Blooms

Webster Lake, 08/22/2018
Photo by: Dan Wells

KDHE Agency Response Plan – 2019

Harmful Algal Blooms

KDHE Agency Response Plan

Revision Dates

October 2010

April 2012

March 2013

July 2015

March 2018

March 2019

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SUBJECT: Harmful Algal Bloom Response Plan

SECTION 1. PURPOSE

This plan is to provide guidance for Kansas Department of Health and Environment's (KDHE) response to reduce the risk of exposure to humans, pets, and livestock from blue-green algal toxins.

Blue-green algal (also known as cyanobacterial) toxins in freshwaters have been implicated in human and animal illness in at least 38 states in the United States¹. In Kansas, blue-green algae are naturally present in most surface waters. When certain conditions develop, such as high nutrient and abundant light levels, these organisms can reproduce rapidly. This dense growth of algae is called a bloom and can sometimes lead to a harmful algal bloom (HAB). These conditions tend to occur in the warmer summer months, after spring rainfalls wash accumulated high nutrient loads from animal waste, agricultural fertilizers, sewage effluent, and urban stormwater runoff into surface waters. Subsequent summer conditions improve water clarity, allowing light to penetrate deeper into waters, fueling primary productivity where nutrients are plentiful. Dry summer conditions can increase the impact of wastewater effluent on lakes and streams, when lower water levels condense nutrients. Blooms can also occur in winter months, although winter dominant algal species have been found to be different from those of spring and summer. Organisms most frequently responsible for HAB outbreaks in both fresh and marine waters include cyanobacteria and dinoflagellates. In Kansas, HABs are most commonly associated with the cyanobacteria *Microcystis*, *Dolichospermum*, and *Aphanizomenon*.

Freshwater blue-green algae under bloom conditions are capable of producing potent toxins that can cause damage to the liver, skin and nervous system.² HABs can vary in toxicity and may pose a direct threat to human and animal health. Exposure to cyanobacterial toxins can result in adverse human health effects such as: hay fever-like symptoms, respiratory distress, skin rashes, vomiting, and diarrhea.³ These toxins have also been identified as the cause of multiple animal deaths in the US.⁴ Exposure to these toxins most commonly occurs when persons or animals come in contact with, ingest, or inhale contaminated water.³ There are no known antidotes to algal toxins, so preventing exposure is imperative.

SECTION 2. OVERVIEW

This plan outlines the interaction, responsibilities, and activities of KDHE and coordination with other stakeholders, to ensure that HAB investigations are conducted in a rapid and effective manner and founded on the principles outlined below.⁵ KDHE does reserve the right to use best professional judgement in making decisions beyond or on occasion contrary to this plan and its protocols, when unusual or unpredicted circumstances occur.

- A. Potential HAB events will be treated as harmful until proven otherwise.
- B. Response to HABs will be limited to “Public Waters of the State” only. If a waterbody is not accessible to the public and does not serve as a public drinking water source, its owners/managers who request assistance with HABs will be referred to the Kansas State Veterinary Diagnostic Laboratory in Manhattan, Kansas. The Veterinary Diagnostic Laboratory will be able to ascertain the presence or absence of cyanobacteria in a water sample.

- 1. In Kansas, for the KDHE Harmful Algal Bloom response plan, “Public waters” and “Private water bodies” are defined as:

- a. **Public waters:** Those waters that are referred to as reservoirs, community lakes, or state fishing lakes and/or are waters managed or owned by federal, state, county, or municipal authorities, as well as all privately owned lakes that serve as public drinking water supplies (PWS) or that are open to the public for primary or secondary contact recreation. *Note: Primary contact recreation includes those activities where the body is immersed to the extent that some inadvertent ingestion of water is probable. This use shall include activities such as: boating, mussel harvesting, swimming, skin diving, waterskiing and windsurfing. Secondary contact recreation includes any activity in which the ingestion of surface waters is not probable. These uses shall include activities such as wading, fishing, trapping and hunting. K.A.R. 28-16-28b and 28-16-28d through 28-16-28h, Kansas Surface Water Quality Standards.*

- b. **Private water bodies:** Any freshwater reservoir or pond that is both located on and completely bordered by land under common private

ownership or is not freely accessible to the public (*i.e.*, access by the public is controlled or restricted in some manner).

c. Rivers and streams. Only classified rivers and streams that are listed in the Kansas Surface Water Register will be investigated, and these will be subject to the same criteria for eligibility as described above for lakes and ponds.

- C.** Response should be as rapid as practicable considering the resources available.
- D.** Response to HAB events and all advice provided will be consistent across all bureaus and responding agencies.
- E.** KDHE will be the primary responder unless multi-agency response is requested.
- F.** The response will include: photo documentation, toxin analysis, and, where warranted and possible, the identification and enumeration of cyanobacteria. All available information will be used to determine the public health advisories.
- G.** Training for all responding agencies for HAB events will be conducted by KDHE to ensure the effective coordination and consistency of response amongst agencies.
- H.** The KDHE Harmful Algal Bloom Response Plan is a dynamic document that is to be reviewed and maintained annually by KDHE.

SECTION 3. KDHE RESPONSIBILITY

Bureau of Water, Watershed Planning, Monitoring, and Assessment Section (BOW-WPMAS) – responsibilities shall include:

- A.** Host and attend the annual Harmful Algal Bloom stakeholder meetings;
- B.** Collect and validate incoming requests for the investigation of blue-green algae blooms to initiate sampling activities; complaints may arrive via the HAB website, HAB telephone hotline, or other forms of communication;
- C.** As needed, collect incoming reports of illness related to Blue-Green Algae (BGA) from the public and forward the information to Bureau of Epidemiology and Public Health Informatics (BEPHI). BOW-WPMAS will forward all requests for public health protection information to the Epidemiology Hotline (EpiHotline);
- D.** Identify sample type, location(s), and number of samples to be collected for recreational waters. Coordinate with BOW-PWSS to obtain non-PWS intake samples at BA or BB sites as required;
- E.** Analyze recreational water samples to determine the type of algae present and the level of microcystin and cylindrospermopsin toxins as needed. Optional analysis includes detailed identification and cell counts of BGA and other algae;
- F.** Coordinate other analytical needs with Kansas Health and Environmental Laboratories (KHEL), as needed;
- G.** Review the results of BGA analysis of water samples, determining the appropriate health advisory as outlined by agency policy;
- H.** Enter the results into the in house Oracle Algae database;
- I.** Host weekly (typically Thursday afternoon) meeting and telephone conference with relevant lake managers and stakeholders to review the current week's data results and to advise recommended lake status;
- J.** Advise lake managers and stakeholders, when appropriate. The appropriate office for notifying stakeholders shall be determined during the initial response, depending on the waterbody and the agencies involved, and shall continue until the conclusion of the response; see BEFS Responsibilities section for other communications. BOW-WPMAS central office shall be responsible for all communications regarding large

reservoirs, public waters owned by other state and/or federal agencies, public waters with more than one stakeholder, or waterbodies that serve as sources for public water supply systems. The agencies with which KDHE will communicate may include:

- a. *Kansas Department of Wildlife, Parks and Tourism (KDWPT, www.ksoutdoors.com)*, which is responsible for management of many recreational areas around Federal reservoirs, state fishing lakes, and other waterbodies, as well as regulation of hunting and fishing in the state;
- b. *U.S. Army Corps of Engineers*, with district offices in Tulsa, OK and Kansas City, MO (USACE, www.usace.army.mil), which is responsible for management of many major reservoirs;
- c. *U.S. Department of Interior, Bureau of Reclamation (USBR, www.usbr.gov)*; with area offices in McCook, NE (308-345-4400) and Austin, TX (512-899-4150), which is responsible for management of seven reservoirs in Kansas.
- d. *Kansas Department of Agriculture-Division of Animal Health (KDAH, <https://agriculture.ks.gov/divisions-programs/division-of-animal-health>)* – KDAH is the office of the state Animal Health Commissioner and may be a point of contact for the public and veterinarians regarding health effects of cyanobacteria on pets and other animals. KDAH communicates with a network of Kansas veterinarians through Flash Reports as well as through publication of a newsletter. Although HAB related animal health reporting is not mandatory in Kansas, KDAH may also report relevant animal health data back to the State Public Health Veterinarian at KDHE-BEHPI. The KDAH number is 785-564-6601.
- e. *Kansas State Veterinary Diagnostic Laboratory (KSVDL, http://www.ksvdl.org/resources/news/diagnostic_insights/january2018/en_sley.html)*. KSVDL serves two very different functions: (1) They can assist private citizens with low cost fee-for-service analysis of water samples, to evaluate for the presence of cyanobacteria and/or cyanotoxins; (2) The pathologists and toxicologists here perform animal necropsies and serve a support function for the state in cases of difficult

animal health investigations. The phone number for KSVDL is 785-532-5650; email is clientcare@vet.k-state.edu.

- K.** Communicate, via consistent messaging and public health advisory information, with lake managers, stakeholders, and users of state managed waters through various means including but not limited to:
 - a.** weekly stakeholder meetings,
 - b.** prepared signage,
 - c.** website updates, and
 - d.** KDHE HAB Hotline;
- L.** Coordinate with the KDHE Public Information Officer (PIO) for the preparation and release of official KDHE Public Health Advisories/News Releases, as warranted;
- M.** Provide technical assistance for water quality questions and interpretation of laboratory analytical results relative to initial and follow-up water samples, as needed;
- N.** Assist the KDHE PIO in responding to public requests for information that require technical or scientific responses;
- O.** Train KDHE and non-KDHE staff concerning sampling methods, sample submission, and chain-of-custody requirements;
- P.** In collaboration with KDHE-Office of Information and Technology, review annually, the Blue-Green Algae Data Management System;
- Q.** Maintain and update content for the HAB website that is associated with and available through the KDHE public website. On this website, all information provided by the Bureau of Environmental Field Services (BEFS), Bureau of Epidemiology and Public Health Informatics (BEPHI) (except for Protected Health Information), and the Bureau of Water (BOW) shall be made available to the public. Such information shall include, but is not limited to: lists and maps of affected waterbodies, general blue-green algae information, photos of HABs, analytical results, public health notices, and warning signs for the public;
- R.** Retain a database of photographic records and scientific data relative to water sampling, and share such data when requested;

- S. Maintain a database the HAB data over time for each affected body of water for future trend tracking and geospatial analysis;
- T. Provide technical expertise related to water quality and watershed management and technical assistance for water quality questions; and
- U. Assist lake owners in identifying possible WRAPS projects, when requested.

Bureau of Water, Public Water Supply Section (BOW-PWSS) – responsibilities shall include:

- A. Attend annual stakeholder meetings;
- B. Schedule with the Kansas Health & Environmental Laboratories (KHEL) to ship sample bottles, prior to May 1 of each year, to PWS that are participating in the voluntary Public Water Supply Harmful Algal Bloom Monitoring;
- C. Provide technical assistance to public water supply systems when BGA affected lakes are their main source for drinking water;
- D. In the event that finished drinking water testing indicates cyanobacterial toxins in excess of the 2015, EPA developed Health Advisories (HA), work with the PWS and KDHE-Public Information Officer (PIO) to issue an immediate Tier 1 public Advisory (24-hour notification) informing all affected customers of the situation. A public notice template will be provided by KDHE containing the appropriate health effects language and use restrictions; and
- E. Encourage public water systems to work with KDHE, their local emergency management agency, and local health departments to develop a coordinated response to cyanotoxin detections in finished water above EPA designated health advisory Levels.

Bureau of Environmental Field Services (BEFS) and its district offices – responsibilities shall include:

- A. Provide or coordinate field staff for water sample collection and, when needed, photographic field documentation;
- B. Collect water samples or recruit qualified non-KDHE staff to do so;

- C. Transport samples in good condition to BOW-WPMAS, or coordinate transportation by qualified individuals, as needed;
- D. Maintain chain of custody from waterbody sampling to delivery of samples for analysis;
- E. BEFS district offices shall be responsible for all communications with lake managers and communities, regarding smaller county, city, and privately owned public use waterbodies;
- F. Assist the PIO in responding to requests for information that require technical or scientific responses from agency stakeholders;

Bureau of Epidemiology and Public Health Informatics (BEPHI) – responsibilities shall include:

- A. Attend annual stakeholder meetings;
- B. Maintain, as part of the KDHE Harmful Algal Bloom public website, the Human Illness Report Form and Animal Illness Report Form, which serve to collect information on HAB-related illness or death from health care providers, veterinarians, and the public;
- C. Answer all health-related questions through the EpiHotline;
- D. Complete the “Algae Bloom Reporting Form” when human or animal health related incidents possibly due to a BGA exposure are reported. This form notifies BOW-WPMAS that a response needs to be initiated;
- E. Provide epidemiological investigation of human and animal illness related to harmful algal blooms;
- F. Provide technical advice on the public health aspects of HABs and coordinate the KDHE public health response;
- G. Analyze data and provide reports of epidemiological investigations of human and animal illness/deaths,
- H. Communicate, as needed, with both Federal and county/local health agencies:
 - a. In addition to compiling data at the state level, BEPHI contributes both animal health and human health HAB reports to the “One Health Harmful Algal Bloom System” (OHHABS) surveillance database, operated by US Centers for Disease Control and Prevention (CDC).

- b. BEPHI communicates regularly with the network of County Health Departments and similar local entities and health care providers across the state; this network may be used to provide educational materials, solicit data, or issue alerts.
- c. BEPHI reserves the option to use the Kansas Health Alert Network (KS-HAN, http://www.kdheks.gov/it_systems/ks-han.htm), in case of a statewide HAB-related emergency. This state emergency alert network includes county/local health departments as well as hospitals, emergency response personnel, any interested health care providers, and many more.

KDHE Office of Communications (OC) – responsibilities shall include:

- A. Prepare and release the official KDHE Public Health Advisories/News Releases (See Appendix G):
 - 1. During a “Warning” or “Closure” status, a Public Health press release will be issued by KDHE; and
 - 2. During a “Watch” status, affected waterbodies will be identified and posted on the KDHE HAB website only, unless otherwise determined.
- B. Advise BOW and BEFS when media requests for information are received that require technical or scientific responses from agency stakeholders; and
- C. Coordinate any public forum events that may be required from time to time, (*i.e.* press conferences, public meetings), during which KDHE representatives may be required to address issues related to HABs.

SECTION 4. ADVISORIES

4.1 Criteria for Public Health Protection Levels

KDHE has established three levels of public health protection recommendations, “Harmful Algal Bloom (HAB) Watch,” “Harmful Algal Bloom (HAB) Warning,” or “Lake/Beach Closure.” These advisory notification levels are determined by the concentration of harmful toxin level(s) and/or the concentration of cyanobacteria cell counts; see **Table 1**. When appropriate, KDHE will recommend the following actions for:

A. Harmful Algal Bloom (HAB) Watch – serves as an advisory to notify the public that hazardous conditions are possible or present. A Watch is issued based on visual confirmation of a bloom, microcystin toxin concentrations, and/or cyanobacterial cell counts. Visual confirmation is determined by qualified KDHE staff working with lake managers and/or managing agencies using jar tests, photographs or site visits. A Watch is issued if it has been analytically determined that the *microcystin toxin concentration* in the water is **greater than or equal to 4 µg/L but less than 20 µg/L⁶** and/or *cyanobacterial cell counts* are **greater than or equal to 80,000 cells/mL but less than 250,000 cells/mL**. Persons should use caution when in contact with lake water and avoid areas of algae accumulation.

1. The appropriate HAB Watch signage (See **Appendix B**) should be posted at all primary public access locations such as beaches, marinas, boat ramps, and other main points of entry to the body of the water. If the provided signage is not used, then sign information must include:

- a. persons should use caution when contacting lake water and wash with clean water afterward;
- b. blue-green algae are present, and the body of water **may** be unsafe for people and animals;
- c. contact information for the posting authority;
- d. the date of the posting;
- e. the symptoms of cyanobacterial exposure;
- f. what to do in case of contact with the water; and
- g. whom to call in case of illness potentially associated with exposure.

The signage should also:

- a. discourage people from having contact with the water near visible blooms (e.g., no swimming, waterskiing);
- b. discourage allowing pets to drink or swim in the water. If pets do come in contact with the water, then they should be rinsed off with clean water immediately. They should not be allowed to lick the algae (and toxins) off of their fur or consume dried algae on shorelines, as algal toxins will remain toxic even in dry form;

- c. permit boating and fishing, although boaters should be aware of the possible inhalation of harmful spray; and
- d. indicate that if fish are caught, the fish should be properly cleaned and rinsed with clean potable water, and all internal organs removed, with only the fillets retained for human consumption;

B. Harmful Algal Bloom (HAB) Warning serves as an advisory to notify the public that conditions **are** expected to be unsafe for human exposure. A warning will be issued if it has been analytically determined that the *microcystin toxin concentrations are greater than or equal to 20 µg/L but less than 2,000 µg/L and/or cyanobacterial cell counts are greater than or equal to 250,000 cells/mL to less than 10,000,000 cells/mL*. If there is verification of significant cyanobacterial surface scum present,⁶ a “Warning” may be issued based on visual confirmation of significant cyanobacterial scum. It is recommended that action be taken over and above those listed in the “HAB Watch,” restricting or prohibiting public exposure.

1. The appropriate HAB Warning signage (See **Appendix B**) should be posted at all primary public access locations such as beaches, marinas, boat ramps, and other main points of entry to the body of water. If the provided signage is not used, then sign information must include:
 - a. that blue-green algae are present and that the body of water is unsafe for people and animals;
 - b. contact information for the posting authority;
 - c. the symptoms of cyanobacterial exposure;
 - d. what to do in case of contact with the water; and
 - e. whom to call in case of illness potentially associated with exposure.

The signage should also:

- a. restrict swimming, water skiing, boating or other activities that would involve direct contact with the affected water;
- b. warn that all contact with water should be avoided;
- c. warn owners not to allow pets to drink or swim in the water. If pets do come in contact with the water, then they should be rinsed off with clean water immediately. They should not be allowed to lick the algae (and

toxins) off of their fur or consume dried algae on shorelines, as algal toxins will remain toxic even in dry form;

- d. warn that if fish are caught, the fish should be properly cleaned and rinsed with clean potable water, all internal organs removed, consuming only the fillets;

- C. Harmful Algal Bloom (HAB) Lake/Beach Closure** notifies the public that extreme conditions exist. At this level, it has been analytically determined that the *microcystin toxin concentration* is **greater than or equal to 2,000 µg/L** and/or *cyanobacterial cell count* is **greater than or equal to 10,000,000 cells/mL**. It is recommended that either a portion of the lake, entire lake, or zone, be closed and in some cases the adjacent land (e.g., approximately 100 ft. from the shoreline) be closed to the public. Actual setback distances will be determined on a site specific basis, if necessary. When partial closures (*i.e.*, beach or cove) are issued, the remaining lake or zone area will carry a warning status.
- D. Zoned Lakes:** Zoned lakes are impoundments considered large enough in size and with shorelines structured in such a manner that they could shelter localized algae blooms, resulting in a combination of conditions that can limit specific portions of the lake to public use. Zoned lakes are differentiated by both size and shape and are limited to those waterbodies with a surface area over 10,000 acres and with a shoreline sinuosity index greater than 4. Only three separate lakes in Kansas meet these criteria: Milford, Perry, and Tuttle Creek Lakes. Exact zone lines were drawn based on visible landmarks for lake users. Each zone's public health protection level is based on the highest sample result collected within a zone. Zoning a lake allows for mixed health protection levels and public contact on a lake. The public should be aware that a combination of conditions can exist in the affected lake, and visitors should observe the posted notices for each specific zone. On these lakes, if a lake manager/owner issues a more stringent advisory in a zone (*i.e.*, beach closure), then KDHE will list the more severe advisory level.

Table 1. Waterbody Status Determination

Waterbody Status Determination

Blue-Green Cell Count and Toxin Exposure Levels

Condition of lake	Advisory Notification Action Level	Recommendations
Microcystin toxicity at $<4 \mu\text{g/L}$ <u>AND</u> Cell count of $<80,000 \text{ cells/ml}$	None – Waterbody clear	None
Microcystin toxicity at $\geq 4 \mu\text{g/L}$ to $<20 \mu\text{g/L}$ <u>OR</u> Cell count of $\geq 80,000 \text{ cells/ml}$ to $<250,000 \text{ cells/ml}$ <u>OR</u> Visual confirmation of bloom	Waterbody will be placed on a Public Health WATCH	<ul style="list-style-type: none"> » Post signage » Notify health dept., doctors, vets, health providers » Post on website » Notify public water suppliers
Microcystin toxicity at $\geq 20 \mu\text{g/L}$ to $<2,000 \mu\text{g/L}$ <u>OR</u> Cell count of $\geq 250,000 \text{ cells/ml}$ to $<10,000,000 \text{ cells/ml}$ <u>OR</u> Presence of significant Cyanobacterial surface scum	Waterbody will be placed on a Public Health WARNING	<ul style="list-style-type: none"> » Post signage » <u>Restrict</u> direct contact with water » Notify health dept., doctors, vets, health providers, etc. » Post on website » Issue media release » Notify public water suppliers
Microcystin toxicity at $\geq 2,000 \mu\text{g/L}$ <u>OR</u> Cell count of $\geq 10,000,000 \text{ cells/ml}$	Waterbody is CLOSED	<ul style="list-style-type: none"> » <u>Recommend</u> That either portions of the lake, the entire lake, or zone, be closed. If necessary – close adjacent land up to 100 ft from shoreline. » Post signage » Notify health dept., doctors, vets, health providers, etc. » Post on website » Issue media release » Notify public water suppliers

E. Other General Health Information

1. If water from an affected lake is used for irrigation, then people should avoid contact with the spray, due to potential inhalation and illness. Avoid fruits and vegetables that have come in contact with contaminated water until they have been thoroughly washed with clean, potable water. Do not allow livestock to drink affected irrigation water. If water is used to irrigate pastures, livestock owners should be aware that continued application of heavily affected waters can lead to significant toxin accumulation on foliage. Although rare, this residue can affect livestock.
2. Areas of an affected waterbody may contain significantly higher HAB concentrations due to wind effects, increasing the health threats in localized areas.

Further information pertaining to HABs and their effects on health can be found on KDHE's HAB website at www.kdheks.gov/algae-illness/index.htm

4.2 Criteria of Status Change of Advisories

- A. A body of water with a HAB Watch will be sampled based on the re-sampling frequency discussed in **Section: Response Prioritization**. The most recent toxin and cell count values will always determine the HAB status of a lake. The only exception to this is when a lake is under Closure or Warning status due to toxin levels in a given week. In these cases, at least two weeks must elapse before a Closure or Warning can be lifted due to new sample data that indicate below-threshold measurements of toxin and/or cell count.
 1. Exceptions: Mixed status lakes. Lakes that have more than one "zone" will be required to follow the above described procedure for each individual zone.
 2. Exceptions: If cyanobacterial cell counts are not analyzed, the decisions to lift or cancel an advisory will be based on microcystin toxin concentrations.

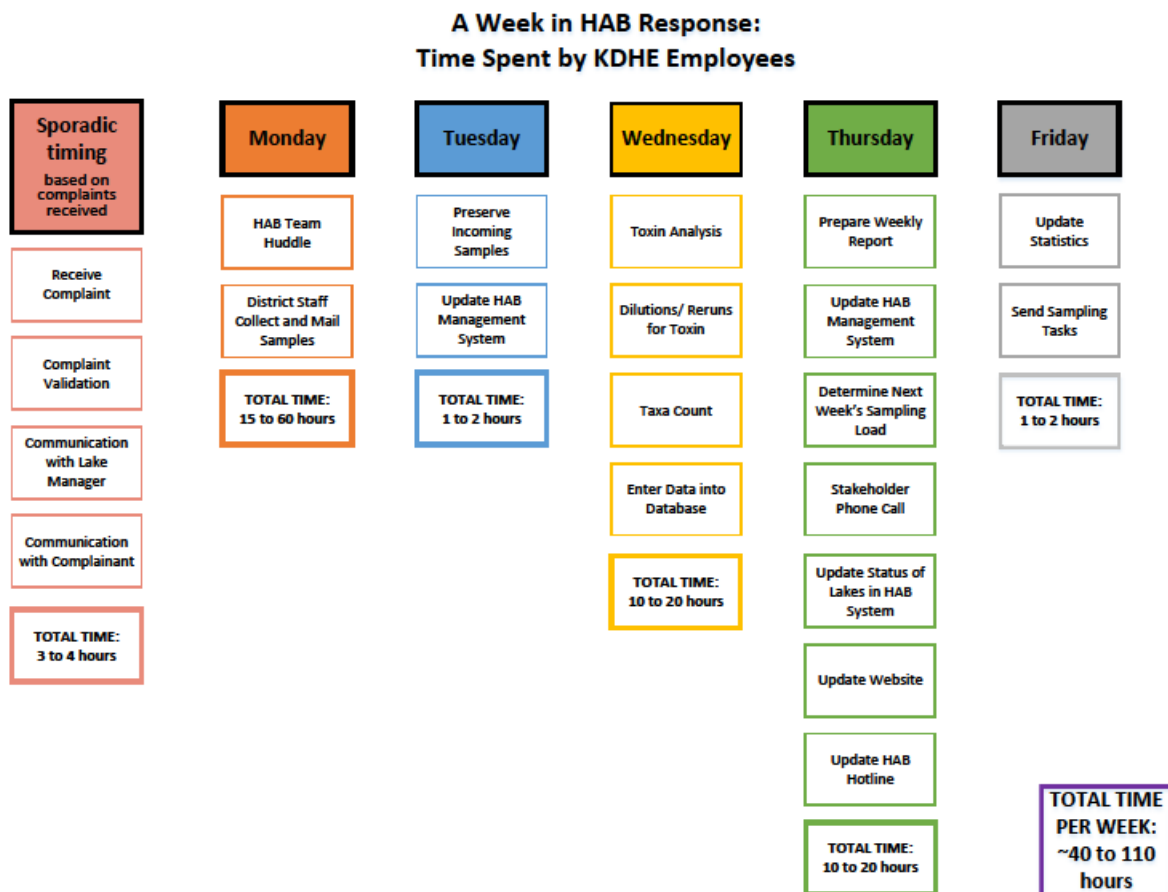
SECTION 5. RESPONSE

5.1 Harmful Algal Bloom Response Procedures

(See **Appendix D**)

- A.** A complaint is received concerning a potential harmful algal bloom in public waters, and an investigation is requested. Prior to any investigation, the complaint must be documented on the “Algae Bloom Reporting Form” located on the KDHE “Harmful Algal Bloom” website. BEFS/BOW will validate the existence of the bloom and location information. If a BEFS district office receives a complaint, it will collect the location information and complete the reporting form. If BEPHI receives a health-related complaint associated with a HAB, BEPHI will complete the “Algae Bloom Reporting Form.”

Figure 1. HAB Response Timeline



- B. If a complaint is not submitted by trained federal or state staff, unless otherwise determined, then as part of the verification process, a jar test and/or photographic documentation is required (See **Appendix H** for additional information on jar testing):
 - 1. This test must be conducted by the lake management authority/manager at a KDHE designated site(s). (If no sampling sites have been previously designated, then contact BOW-WPMAS for site locations.)
 - 2. Photos of the jar test(s) must be submitted/emailed to BOW-WPMAS for verification along with any other photo documentation. Jar tests photos will be uploaded to the HAB tracking database.
- C. BOW-WPMAS will enter the investigation request information into the KDHE HAB Management System for tracking.
- D. BOW-WPMAS will prioritize responses and issue sampling request.
- E. BEFS District offices will collect samples and ship or transport to KDHE Central Office in Topeka, BOW-WPMAS.
- F. BOW-WPMAS will analyze the recreational samples collected and enter the analytical results into the BOW ORACLE Algae database, which will then migrate into the HAB Management System.
- G. BOW-WPMAS will review the analytical results and, if warranted, a public health recommendation will be issued consistent with KDHE's Harmful Algal Bloom Policy (See **Appendix A**).
- H. All complaint locations will be checked to determine whether the waterbody is a drinking water supply. If so, then BOW-PWSS will notify the affected PWS immediately to discuss the status of the source and provide technical assistance when needed. (See BOW-PWSS **Appendix F**).
- I. BOW and BEFS District Offices will contact agencies, municipalities, lake owner/managers, other external stakeholders and, if applicable, the complainant, to provide them with the analysis results and the KDHE public health recommendations.
- J. Lake Managers will post the waterbody with the appropriate signage (See **Appendix B**).
- K. BOW-WPMAS will coordinate any meetings between Bureaus and between KDHE and other state and federal agencies.

- L. BOW will coordinate memos of recommendation for KDWPT through the Secretary's office, if needed.
- M. BOW will notify the Secretary's Office/PIO of the status for all affected waterbodies. The Office of Communications will prepare formal agency press releases and coordinate as needed with other stakeholders' Office of Communications. (See **Appendix G**)
- N. BEPHI will communicate with public health departments and animal health agencies as needed, to deliver public health advisory information.
- O. BOW-WPMAS will update the HAB Management System.
- P. Based upon the HAB status, BOW will prioritize and coordinate proper follow-up testing consistent with the KDHE plan on blue-green algae response (See **Figure 1**).
- Q. BOW will prepare information for updating of the BGA website and send it to the KDHE webmaster.
- R. BEPHI will conduct investigations of human and animal illness or deaths related to harmful algal blooms.
- S. BOW will update the HAB Management System contact list as needed.
- T. BEPHI will analyze data and provide reports of epidemiological investigations and human and animal illness and death.

5.2 Response Prioritization

The investigation timeframe and the prioritization of waterbodies shall be determined according to the following parameters, described in detail below and in **Table 2**:

- A. When there has been a human or animal health report.
- B. When the complaint concerns a waterbody that is an active public water supply source.
- C. Whether the number of complaints exceeds KDHE's capacity resources, taking into account both sample collection and laboratory analysis.
- D. When re-sampling is required.
- E. When the situation does not reflect the above situations.

Table 2. Priority Response Timeframe

Lakes That:	Priority	Response
Support: Public Beach Public Water Supply Full Body Contact Activities Confirm: Human Illness	Priority 1	Samples will be collected within the immediate week if the HAB complaint form was received and verified prior to Wednesday of the sampling week. Sampling will be conducted on the following Monday otherwise. PWS that test above the HA at the plant intake will be sampled as promptly as possible.
Public lakes that are publicly accessible but have no swimming beach and do not allow full body contact activities.	Priority 2	If resources are available and sampling capacity allows, samples will be collected within the immediate week if the HAB form was received and the complaint verified prior to Tuesday of the sampling week. Otherwise, sampling will be conducted on the following Monday.
Other public lakes that are largely inaccessible to the general public.	Priority 3	Will respond if capacity resources are available. Otherwise, the response will be handled through technical advice utilizing site photography and jar testing. KDHE may issue advisories based on visual evidence. The complainant may be advised to contact their local extension office or the Kansas State Veterinary Diagnostic Laboratory at: KSVDL Client Care 1800 Denison Ave. Manhattan, KS 66502 785-532-5650 Clientcare@vet.k-state.edu

* **K.A.R. 28-16-28b** - Kansas Water Quality Standards ...*Public water bodies* - any surface water or surface water segment that supports or, in the absence of artificial sources of pollution, would support one or more of the designated uses of surface water defined in K.A.R. 28-16-28d (b) or K.S.A. 82a-2001(c), and amendments thereto, and that meets the criteria for classification given in K.A.R. 28-16-28d (a).

****K.S.A. 65-171d - (d)** ... If a freshwater reservoir or farm pond is privately owned and where complete ownership of land bordering the reservoir or pond is under common private ownership, such freshwater reservoir or farm pond shall be exempt from water quality standards except as it relates to water discharge or seepage from the reservoir or pond to waters of the state, either surface or groundwater, or as it relates to the public health of persons using the reservoir or pond or waters there from.

A. Health Related Reports

1. *Initial Sampling.* When there has been a human or animal illness reported, response will be given a high priority. If district staff are unable to provide a timely response, then staff from the Topeka office will respond to the complaint.

If staff at the Topeka office cannot respond, then KDHE may request assistance from the KDWPT or USACE or another partner agency for sample collection.

B. Public Drinking Water Source

1. *Initial Sampling.* When the waterbody is a public drinking water source, then sampling will be initiated as promptly as possible.

C. Does Not Exceed KDHE Capacity

1. *Initial Sampling.* When the number of complaints does not exceed the agency capacity, then the response will be initiated as promptly as possible. (See **Figure 1** or **Appendix C** for a more complete timeline). To minimize the potential of exceeding staff capacity, KDHE may request assistance from the KDWPT or USACE for sample collection.

D. Exceeds KDHE Capacity

1. *Initial Sampling.* When the number of complaints exceeds the agency capacity (to include sample collection and laboratory analysis), then response priorities will be determined by pre-set categories. (See **Table 2**).

E. Re-Sampling Frequency

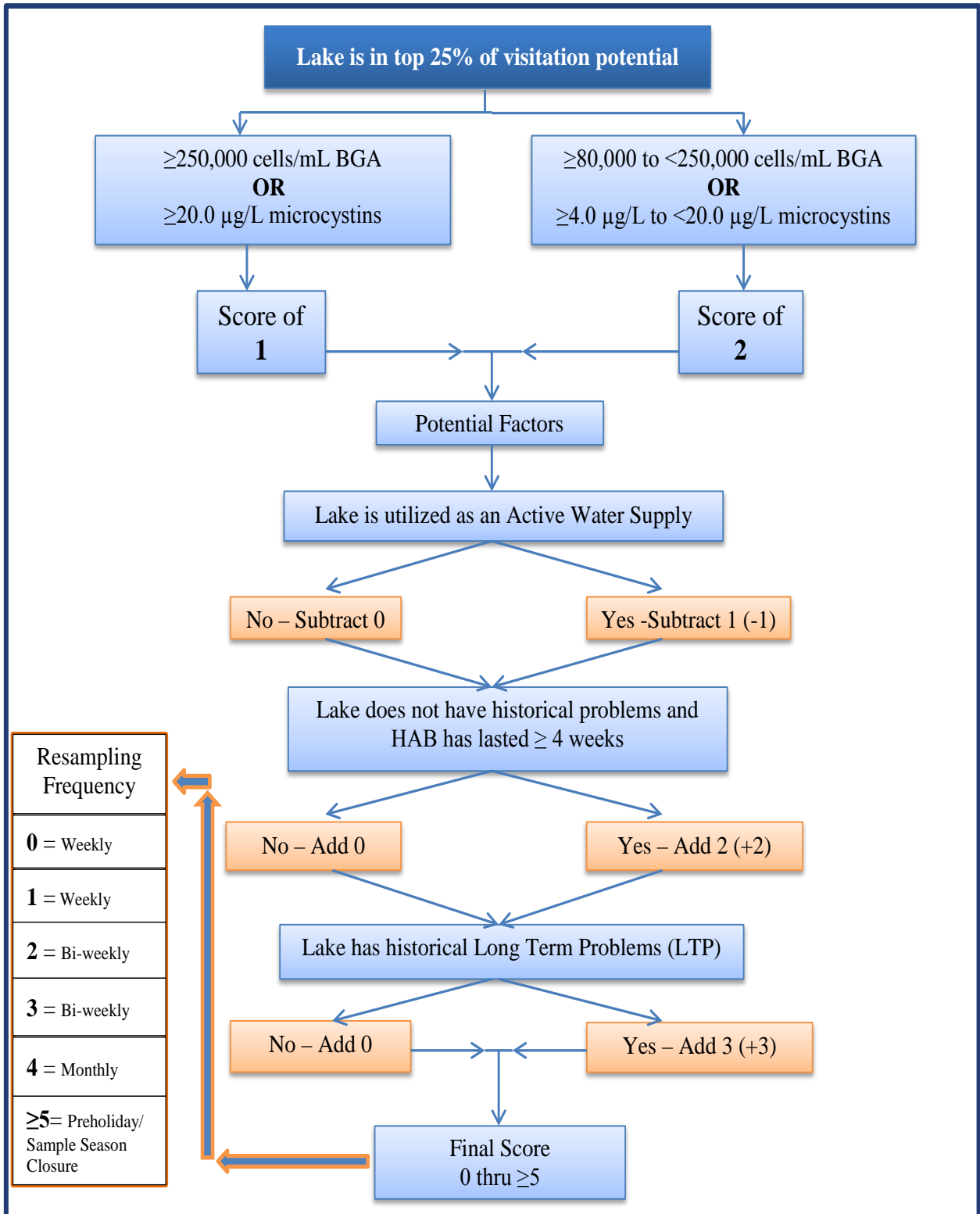
1. During confirmed BGA blooms, the re-sampling frequency for affected surface waters is directly associated with the initial sampling analytical results, the waterbody's "Lake Visitation Potential," and three other potential factors. All water impoundments listed in the Kansas Surface Water Register have been ranked within either the upper 25th percentile for "visitation potential" or in the lower 75th percentile for "visitation potential" (**Appendix K**). Visitation potential is determined using the following formula (**Figure 2**). Using this "score," BOW-WPMAS staff determine the resampling frequency for continued HAB monitoring.

Figure 2. Visitation Potential Formula

$$\begin{aligned} \text{Lake Visitation Potential} = & \text{Population within 30 Miles} \times \\ & \text{Lake Size Factor} \times \text{Lake Density Factor} \times \\ & \text{Public Access Factor} \times \text{Contact Recreation Factor} \\ & (\text{Appendix K}) \end{aligned}$$

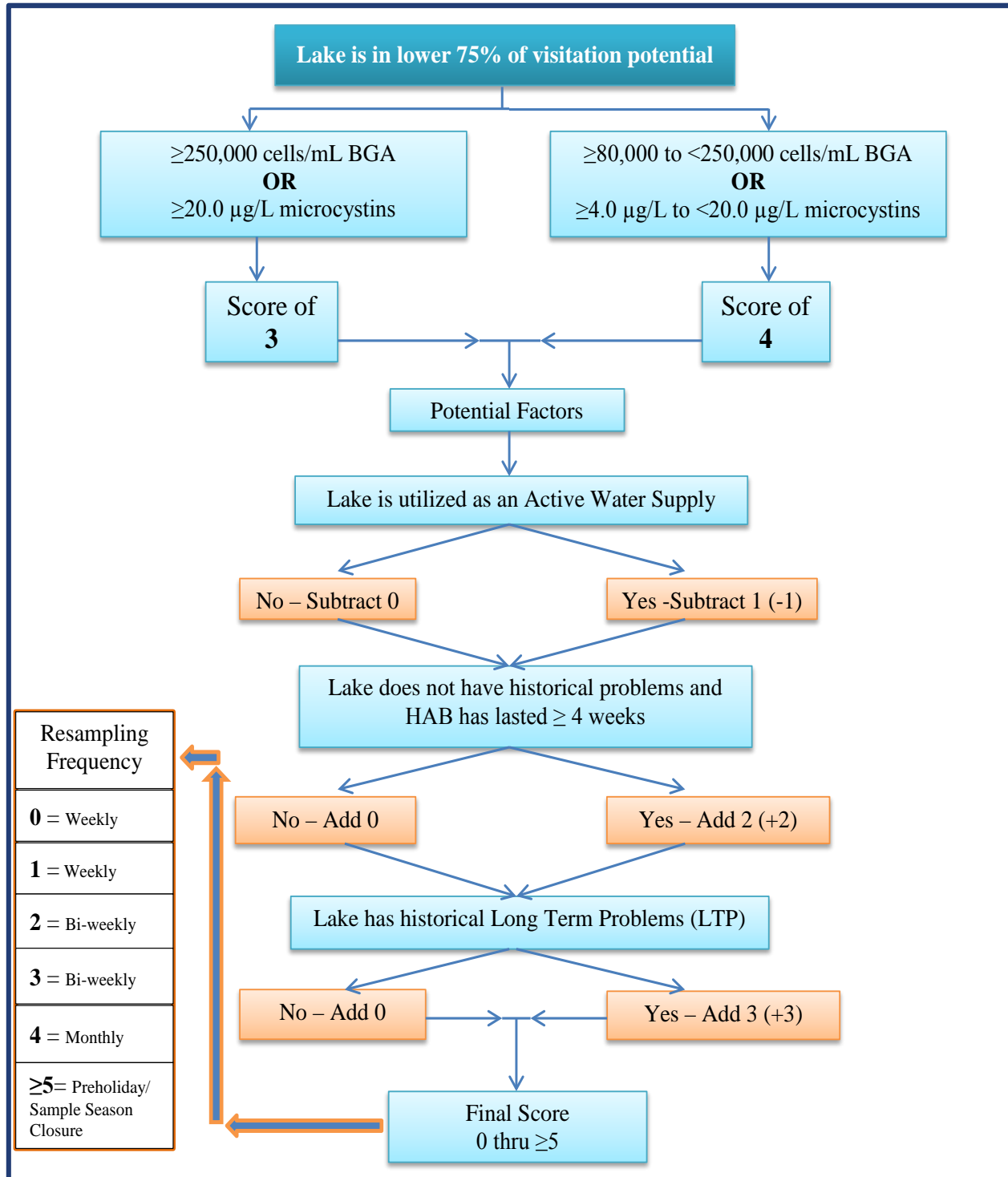
- a. Determining re-sampling frequency for top 25% for visitation potential, see **Figure 3**.

Figure 3. Determining Resampling Frequency for Public Lakes with top 25% for Visitation Potential



- b. Determining resampling frequency for lower 75% for visitation potential,
See **Figure 4**.

Figure 4. Determining Resampling Frequency for Public Lakes with Lower 75% for Visitation Potential



- F.** Lakes that do not have a “visitation potential” ranking will be re-sampled monthly or at a frequency determined by the initial response priority and KDHE staff. Priority 1 Response Lakes will be given a higher priority than priority 2 or 3 responses for resampling. Priority 1 responses may be re-sampled more frequently as determined by KDHE. Priority 2 and 3 responses may be sampled less frequently as determined by KDHE.
- G.** Sampling Deferment: KDHE may defer weekly sampling for a specific waterbody during prolonged and stable HAB events. Sampling may be deferred until visual conditions are indicative of water quality improvement.
- H.** Any situations that occur at surface waters not defined above will be considered on a case-by-case basis.
- I.** When the complaint is received for privately owned lakes (single owner shorelines or lakes with restricted access to the general public), the complainant will be advised on how they can screen their waterbody using the “Jar Test” and to contact their local extension office or the Kansas State Veterinary Diagnostic Laboratory at:

KSVDL Client Care
 1800 Denison Ave.
 Manhattan, KS 66502
 785-532-5650
 www.ksvdl.org
clientcare@vet.k-state.edu

5.3 Sampling Season

- A.** The HAB sampling season will adopt a sampling duration concurrent with the Kansas Surface Water Quality Standards Primary Contact Recreation season, from April 1 to October 31. New and continued investigations will no longer be conducted after the 31st of October, except in special circumstances. A final sample will be collected at all surface waters that are still under a HAB watch/warning/closure in the last week of October to document the final analytical results and public health advisory level for the season.
- B.** Occasionally, winter blooms of the blue-green species *Planktothrix rubescens* have been reported in Kansas (appearing as surface scums of purple to red material or

observed under thin ice covers). In the event a *Planktothrix rubescens* bloom is suspected, then it will be handled on a case by case basis.

- C. End of Season.** If lakes are still under an HAB Notification (Watch/Warning/Closure) by October 31st, then it is the responsibility of the lake's management authority to conduct observational monitoring and jar testing to assess the condition of the waterbody. BEFS/BOW staff will contact appropriate lake management to assist with the lake assessment. Until KDHE receives evidence of a negative jar test or other compelling observational data that the bloom has expired, the waterbody will remain over the winter at the status that was in effect on October 31. If the jar test or other observational data confirms the lack of a significant blue-green community, then KDHE will lift the end of the season notification.

For further questions regarding sampling of lakes and cyanobacteria, contact KDHE's Bureau of Water/Bureau of Environmental Field Services at the Harmful Algal Bloom Hotline, **785-296-1664**.

For further questions regarding health effects of cyanobacteria on humans, contact KDHE's Bureau of Epidemiology and Public Health Informatics at **877-427-7317**.

For further questions regarding health effects of cyanobacteria on pets and animals, contact the Kansas Department of Agriculture Division of Animal Health at 785-564-6601 **during normal business hours**. If assistance is needed for an urgent issue after business hours, call the KDHE Epidemiology Hotline at 877-427-7317.

SECTION 6. SAMPLING

6.1 Sampling Safety

- A. Field staff must exercise caution to protect themselves during HAB sampling events as cyanobacteria can produce toxins that can cause skin irritation, respiratory and/or gastric problems. When sampling from an area that has been reported to have a bloom, the following safety precautions must be followed.
- B. Depending on each sampling location and situation, samplers should wear at a minimum:
 - 1. Gloves, Latex or Nitrile
 - 2. Eye protection such as safety glasses or goggles, depending on the presence of splashing or spray
 - 3. Boots or closed shoes
 - 4. Long pants
- C. If any of the following conditions apply, then additional Personal Protective Equipment (PPE) may be necessary.
 - 1. Conditions include:
 - a. If significant visual bloom or scum is present, and breezy conditions create wave action that may generate spray or aerosolize the water;
 - b. If there is a noticeable odor;
 - c. If prior week's samples indicate toxins are present and at levels greater than or equal to 2,000 µg/L;
 - 2. Additional Personal Protective Equipment includes:
 - a. Elbow length gloves, Nitrile rubber
 - b. Goggles or splash guard
 - c. Waterproof tall boots or hip waders
 - d. For staff who are certified to wear one, half-face respirator fitted with Organic Vapor/HEPA filters. **If sampler is not certified**, then the DEAs/Supervisors may need to send staff who are qualified to wear

respirators, or provide photographic evidence of extreme conditions.

When conditions are warranted (*i.e.*, evidence of significant cyanobacterial matting), BOW-WPMAS staff may notify District Offices that personnel who are qualified to wear respirators are required to perform the sampling.

D. General Sampling precautions:

1. Do not allow the water to come in contact with exposed skin.
2. Do not touch hands to mouth, eyes, or other exposed areas of the body before washing.
3. Hands should be washed thoroughly with soap and clean, fresh/potable water after sampling and before eating, drinking, or smoking.
4. Remove any rings, watches or other jewelry that might have been exposed to algae contaminated water and wash skin surface area and items.
5. All equipment, gloves, and waders should be rinsed with clean water (not lake water) after sampling and before storage.
6. Used disposable gloves should be removed using proper technique to avoid contamination.
7. All wet clothing should be removed and replaced with clean, dry clothing.
8. Wet clothing should be washed separately before next wearing.
9. Do not inhale spray from boats, wind, other water surface disturbances or irrigation water from areas with harmful algal blooms.
10. Do not ingest affected water.

E. Different species of algae can produce different toxins such as neurotoxins, liver toxins, and skin irritants. It is important that field staff can recognize exposure indicators associated with algal blooms and report to their supervisors if they begin to experience potential symptoms. Symptoms can occur immediately or within days of exposure. Those symptoms can include:

1. Skin irritation – visible rash, hives, or blisters, especially under clothing, swimsuits, or wetsuit.

2. Respiratory problems – runny eyes and nose, sore throat, headache, and asthma-like symptoms.
 3. Kidney toxicity – acute, severe gastroenteritis (including diarrhea and vomiting).
 4. Liver toxicity – abdominal pain, diarrhea, and vomiting, may take hours or days for symptoms to appear in humans.
 5. Neurotoxicity – numb lips, tingling fingers and toes, or dizziness, often appear within 15 to 20 minutes of exposure.
- F. Field personnel should be aware that hazardous conditions potentially exist at every waterbody. If unfavorable conditions are present at the time of sampling, including the need to have additional PPE, or if hazardous weather conditions arise, such as lightning or high winds, then personnel should cease sampling, move to a safe place, and contact their DEA/Supervisor. Sampling can be rescheduled for a time when weather conditions have improved, or the appropriate staff with PPE are available.

6.2 Sample Collection/Sample Locations

- A. Samples will be collected in accordance with BOW-WPMAS Standard Operating Procedures, SOP HAB-001 (**Appendix J**).
- B. Sampling stations for toxin or phytoplankton analysis will be selected based on common public access points, which for this particular sampling task are primarily defined: swimming beaches, boat docks/ramps, marinas, shoreline adjacent to maintained trails and marked fishing areas, and other frequently used areas designated for public access. All sample stations will initially be determined by KDHE's Central Office. Once these stations have been identified, they will then be plotted on maps that will be provided to those conducting the sampling. If it is determined that nutrient samples are needed, they will be collected at a HAB sampling station or near BOW-WPMAS's ambient Lake Program sampling station.
 1. If a bloom is observed at other common public access points of the lake that are not designated sampling stations, then all designated stations shall still be sampled, and an additional sample may be collected at the point where the

bloom can be readily observed, and the public can readily access the water's edge.

- a. If there is not an easy and readily available point of public access to collect this optional sample, then no additional sample is required. Under these circumstances, a determination of the status may be based on the observation of an obvious bloom and from the results of the samples collected at the designated stations. The status may be set at least at a Watch level, and the waterbody will likely be resampled the following week.
2. If, upon arrival, it appears that the sample collection at the designated stations is unattainable, (due, e.g., to flood waters, drought conditions/no water, impassable roads) then an alternate sample location may be determined by the sampler within proximity of the original station.
3. If public waters are water sources for Public Water Supply Systems (PWS), and the PWS is not participating in the voluntary monitoring program, then:
 - a. When a complaint is validated, the BOW-PWSS will be notified.
 - b. When directed by the Public Water Supply Section, BEFS will collect initial samples at PWS stations as well as "recreation" stations. If there is no established KDHE PWS sample site, then see below.
 - c. As needed, BOW-WPMAS will establish PWS sampling stations relative to raw water intake locations:
 1. Samples will be collected as close to the intake as possible, or
 2. Discharge samples will be collected if a PWS intake is downstream from the impacted lake/reservoir and the outflow from that lake/reservoir comprises a significant proportion of stream flow arriving at the intake of that PWS (as determined by mass balance calculations).
 3. KDHE has the discretion to initiate river monitoring at locations above the PWS intakes to confirm the absence/presence/concentration of microcystin toxins, if warranted.

4. If levels are detectable, then KDHE-PWSS will coordinate with the affected system(s) to determine recommended resampling (See **Appendix F**).
- d. For PWS not participating in the voluntary monitoring program it will be recommended to continue to resample at PWS intake as long as the lake has elevated levels impairing recreational status (See **Appendix F**).
4. Other types of sampling may be required to determine background levels or potential contaminant sources, or to determine whether public waters used for livestock watering are impacted.
5. Lakes that have multiple zones may require new sampling locations if persistent (≥ 3 days) winds drive existing blooms into unmonitored areas. During initial response activities, the zone that was subject to the response will be sampled at all established sampling stations. At a minimum, one sample from all other zones will be sampled during the initial response for microcystin toxins. During subsequent sampling activities, KDHE will determine which zones warrant testing.
6. For any newly established sampling locations, a GPS point should be recorded (Datum NAD83), or the location must be marked on a map.

C. Miscellaneous Waterbody Sampling

1. Streams/Rivers

- a. Only classified rivers/streams listed in the Kansas Surface Water Register will be investigated.
- b. Initial sampling will typically be conducted by BEFS District Office staff or by BOW-WPMAS Central Office staff, depending upon location and resources available.
 1. If analysis for toxins are above detection, then BOW-PWSS will notify all Public Water Supply (PWS) systems downstream, and it will be the responsibility of the systems to continue resampling. (See PWS **Appendix F**), or
 2. If analysis indicates that toxin and/or cell count levels are above recreation levels, then resampling and notification will be at the

discretion of the agency for livestock watering, irrigation, and recreation uses.

2. Sampling and resampling of other miscellaneous public use waterbodies (homeowner association, livestock watering, and holding ponds) will be conducted at the discretion of KDHE.

6.3 Sample Types/Sample Analysis

There will potentially be three types of samples collected for HAB events: toxin samples, phytoplankton samples, and nutrient samples. Samples will be collected in accordance with BOW-WPMAS HAB-001 and HAB-002 (**Appendix J**), and analysis will be in accordance with BOW-WPMAS HAB-003 (**Appendix J**).

A. Toxin samples:

1. Toxin samples will always be analyzed for levels of microcystin toxins, using the ELISA Qualitube Kit (EnviroLogix, Portland, ME)
2. When cyanobacteria that produce Cylindrospermopsin toxin have been identified, then the level of toxin may be determined using Abraxis (Abraxis, Inc, Westminister, PA) test strips (optional).

B. Phytoplankton samples: Depending on the amount of resources available, phytoplankton samples may be analyzed for:

1. Taxon identification, with blue-greens typically to genus;
2. Cell counts and blue-green cell percentage;
 - a. If the analytical lab is at capacity for sample processing, then, for lakes that have more than one station, KDHE has the discretion to determine which sample will have taxonomy and cell counts performed. Typically, the sample with the worst (most green) visual appearance will take priority. If there is no discernible difference between the worst sample(s), then KDHE will select the sample that is most likely to have a negative impact on health, based on data available. Data informing this decision could include the importance of the sampling stations for human health, wind conditions during sampling, reporting from the field,

photographic evidence, jar test results, or previous analysis results (**Appendix I**).

- b. Those samples not analyzed during the response week should be retained for the duration of the HAB season, at which time KDHE may determine to perform analysis or dispose of the sample(s).

- 3. Cell biovolume (at the discretion of analyst).

C. Nutrient samples **may be analyzed for:**

- 1. Nitrate;
- 2. Nitrite;
- 3. Kjeldahl nitrogen;
- 4. Total phosphorus; and
- 5. Ammonia.

D. Additional field and laboratory measurements and analytes may include:

- 1. Water Temperature (field);
- 2. Air Temperature (field);
- 3. pH (field or lab);
- 4. Dissolved oxygen (field or lab);
- 5. Chlorophyll-a; and
- 6. Liquid Chromatography Mass Spectrometry (LCMS) analyses for microcystin variants and other algal toxins.

Sample analysis will be conducted in accordance with BOW-WPMAS SOP HAB-003 (See **Appendix J**). Additional analyses may be required and will be based on individual investigation circumstances.

SECTION 7: ANNUAL PROGRAM MANAGEMENT

The HAB program is busiest during the April to October contact recreation season but has multiple tasks during the off season. The following is a general annual timeline of events, beginning with the first day of the active season.

- **April**
 - All involved staff are informed of any new changes to the KDHE Agency HAB Response Plan as well as any changes to the computer interface side of the HAB program.
 - If no changes have taken place, the staff is still informed/refreshed with current protocols.
 - Stakeholders are sent standing invitations to the weekly HAB Meeting and Conference Call.
 - Once the first complaint comes in, the weekly work cycle is followed, as documented in **Appendix C**. This continues throughout the season.
- **September**
 - The process of compiling subjects and inviting speakers and exhibitors for the annual meeting begins, along with identification of possible venues and dates.
- **October**
 - All lakes left with advisories will be sampled to determine their season closure status.
 - In this final month of HAB season, during the conference call and in the stakeholder weekly email, KDHE solicits suggestions for changes to our HAB Response Protocol.
- **November**
 - The BOW-WPMAS response team works with KDHE Office of Information and Technology staff for any modifications to the software or databases that support the HAB response program.
 - At the end of November, the team begins contacting lake managers with the object of closing out as many outstanding advisories as possible.

- The speakers and agenda for the annual meeting are set, and the date and location are finalized.
- Identify and begin completion of all other tasks and arrangements required for the annual meeting. This includes the initiation of any necessary contracts, mechanisms for participant registration, and the like.
- **December**
 - At the end of the month, call and close out as many outstanding advisories as possible, then, at the end of the month, close out in the HAB system any existing lakes on advisories.
- **January**
 - Re-submit any lakes that were not lifted in the previous year into HAB Management System. The closeout and re-submission is done so that the system can generate annual statistics and to track extended HAB problems.
 - Complete all final arrangements and tasks for the annual meeting, including: agendas; name tags; acquisition of equipment, printing of materials, etc.
 - The annual meeting is held.
- **February**
 - A hot wash of the annual meeting takes place to document improvement for the next annual meeting.
 - A conference room for Thursday afternoons from April 1 through the Thursday after the last Monday in October is reserved.
 - All revisions proposed for the response plan are discussed and those deemed necessary are added to the plan.
- **April** – the cycle begins again

SECTION 8. DATA MANAGEMENT

Waterbody data, analysis data, advisory status, and tasks are managed through the HAB Data Management System, which includes three components.

- A. The Survey Web Application takes complaints from the public and/or lake managers for possible harmful algal blooms and Human and/or Animal Illness complaints (**Appendix L**, DM-001). Beginning sometime in 2019, this front end will be built in ESRI Survey123.
- B. The HAB Tracker, which is built in Apex software environment, manages complaints, field assignments, evaluates the final analytical results, and calculates the health protection level recommendations. In addition, this program has a web presence which shows locations, recommendations and the ability to produce data reports (**Appendix L**, DM-003.)
- C. ORACLE and GIS databases. The data support for the “Harmful Algae Bloom” system consists of two parts: 1) the “Site ID” geospatial database; and 2) the ORACLE ENVI Algae Database (**Appendix L**, DM-002.)
 1. *Site ID* geospatial database contains waterbody map coverages as well as a map of existing sampling stations. New sampling stations can also be added through this application. This system is linked to the HAB Tracker and provides all geospatial data for it.
 2. *Algae Database* contains taxonomy, cell counts, and results of toxin analyses performed at the KDHE central office. This system is linked to the HAB Management System and is required to be completed to provide the HAB Management System with the data needed to evaluate and generate a health protection level recommendation.

WORKS CITED

1. Resource Media, National Wildlife Federation. *2014 Harmful Algal Bloom State Survey: Summary of results and recommendations*. Resource Media: Toxic Algae News, 2014.
2. **Kuiper-Goodman T, Falconer I and Fitzgerald J**. Chapter 4: Human health aspects. [Book auth.] Chorus I and Bartram J (eds.). *Toxic Cyanobacteria in Water: A guide to their public health consequences, monitoring and management*. Geneva: World Health Organization, 1999.
3. **Falconer I, Bartram J, Chorus I, Kuiper-Goodman T, Utkilen H, Burch M and Codd GA**. Chapter 5. Safe Levels and Safe Practices. [Book auth.] Chorus I and Bartram J. (eds.). *Toxic Cyanobacteria in Water: A guide to their public health consequences, monitoring and management*. Geneva: World Health Organization, 1999.
4. **Backer L.C., Landsberg J.H., Miller M., Keel K., Taylor T**. *Canine cyanotoxin poisonings in the United States (1920s–2012): Review of suspected and confirmed cases from three data sources*. Toxins, 2013.
5. Queensland HAB Steering Committee. *Queensland Harmful Algal Bloom Response Plan*, Version 1, December 2002.
6. World Health Organization. Chapter 12: Monitoring and assessment. *Guidelines for safe recreational waters: Volume 1 – Coastal and fresh waters*. Geneva: World Health Organization, 2003.

APPENDIX A

KDHE Policy: Guidelines for Addressing Harmful Algal Blooms in Kansas Recreational Waters

January 21, 2015

KDHE INTERNAL DIRECTIVE 1101.1

Subject: Policy: Guidelines for Addressing Harmful Algal Blooms in Kansas Recreational Waters

1. PURPOSE.

Protecting the public's health, safety and welfare as well as the environment is the mission of KDHE. Harmful Algal Blooms (HAB) present unique difficulties in health risk assessment determination. This policy considers health and environmental risks as well as the economic impact on resources within our agency. The basis for this policy is the epidemiologic and scientific study of HAB data collected by KDHE in Kansas and the analysis of established scientific and medical research including studies conducted by the World Health Organization (WHO).

2. DISCUSSION.

Cyanobacteria, also known as blue-green algae, can produce toxins in recreational waters and have been implicated in human and animal illness in Kansas. The threat to health is related to the prevalence of cyanotoxins and cyanobacterial cell concentrations in recreational water and corresponding contact with or accidental ingestion of the cyanobacteria cells or cyanotoxins. During a HAB, those most at risk when exposed are small children. Actual acute exposures have demonstrated that there is a higher incidence of illness among children that suggest risk calculations based on data from adults or animal studies may not be sufficient to protect children. Other susceptible sub-populations include those with compromised immune systems. Even though the effects of microcystin on persons with weakened immune systems are not yet fully understood, there is enough information to raise concern. The most common complaints after recreational exposure to cyanobacteria and associated toxins include vomiting, diarrhea, skin rashes, eye irritation and respiratory symptoms. As the concentration of cyanobacterial cells increases the probability of adverse health effects also increases.

3. PROCEDURES.

KDHE performs sampling of recreational bodies of water for cyanobacteria once alerted to a potential bloom. KDHE has the capability to test for microcystin toxin and to quantify and identify the type of cyanobacteria present. When a HAB has been properly identified in a Kansas public lake, KDHE will issue either a Public Health Watch or Public Health Warning, dependent on the level of risk associated with the HAB as determined through water sampling and testing. The issuing of a Public Health Watch or Public Health Warning is based on the concentration of microcystin toxin or cyanobacteria cell counts.

4. ACTION:

The primary distinctions between a Public Health Watch and a Public Health Warning are:

- a. the level of risk that needs to be communicated to the public; and
- b. recommended actions to the governing authority of the affected body of water to discourage exposure.

Implementation of appropriate measures to restrict exposure will be the responsibility of the governing authority of the affected body of water. If the governing authority chooses to post or close the body of water, KDHE can provide examples of informational, watch, warning or closure signs.

A Public Health Watch will be issued when the microcystin toxin concentration is detectable at a concentration of 4 µg/L to less than 20 µg/L or cyanobacterial cell counts are 80,000 to less than 250,000 cells/ml. A Public Health Watch includes posting of signs at beaches, marinas, boat ramps and other points of public access to the body of water. The Public Health Watch will indicate that harmful algae are present and that the body of water may be unsafe for people and animals. The Public Health Watch will also describe the symptoms of cyanobacterial poisoning, what to do in case of exposure to a cyanobacteria bloom and who to call in case of illness potentially associated with exposure. The Public Health Watch will discourage people from having full body contact (e.g., swimming, water or jet skiing, etc.) in areas of the lake with a visible bloom and allowing their pets to drink or swim in the water. Swimming, skiing, wading, tubing and other contact recreation may occur in portions of the lake without a bloom. Boating and fishing are acceptable provided that, if body contact does occur with the affected water, that exposed areas be washed with clean water as soon as possible. If fish are caught during a Public Health Watch, the fish should be properly cleaned and have internal organs removed before eating. If water from the lake is used for irrigation, people should avoid the spray, thoroughly wash fruits or vegetables in clean water, and not allow livestock to drink the irrigation water. In addition, a Health Alert Network (HAN) message will be sent to all local health departments, physicians, veterinarians and hospitals to provide them with advance notification of the HAB, prior to the Public Health Watch being placed on KDHE's HAB website. Local Health departments, physicians, veterinarians and hospitals are asked to report adverse health events associated with cyanobacteria toxin poisoning to the KDHE Infectious Disease Epidemiology and Response section. Also, any public water suppliers with intakes in the affected water body or downstream of the water body will be notified.

A Public Health Warning will be issued when microcystin toxin concentrations are greater than or equal to 20µg/L or cyanobacterial counts are greater than or equal to 250,000 cells/ml. A Public Health Warning may also be issued if there is verified documentation of a visible, pervasive cyanobacterial scum present. A Public Health Warning will indicate that harmful algae are present at a level considered unsafe for people and animals. A Public Health Warning includes all of the actions under a Public Health Watch with the addition of any contact with water is considered a high risk and should be restricted, including swimming, wading, water or jet skiing. Boating should be conducted to limit the

spraying of aerosols that would create the potential for the inhalation of affected water. When microcystin toxin concentrations exceed 2,000 µg/L or cyanobacteria cell counts are greater than 10,000,000 cells/ml, then it is recommended that all in-lake recreation cease and that picnic, camping and other public land activities adjacent to affected waters be closed. A media release will be issued to the public containing all lakes under a Public Health Warning and public water suppliers with intakes in the water body affected will be notified.

5. SAMPLING

A body of water with a Public Health Watch will be tested by KDHE on a regular basis and in a consistent manner. The Public Health Watch will remain in effect until the cyanobacterial concentrations are less than 80,000 cells/ml at all sampling sites and microcystin toxin concentrations are less than 4µg/L at all sample sites.

A body of water with a Public Health Warning will be tested by KDHE on a regular basis and in a consistent manner. The Public Health Warning will remain in effect until the cyanobacterial concentrations are less than 250,000 cells/ml at all sample sites for at least one week and concentrations of microcystin toxin concentrations are less than 20 µg/L for two consecutive weeks at all sample sites. Bodies of water that fall below these levels and within these time periods may still not completely come off of a public health protection notification, but may be reduced to a “Watch” level. The Public Health Watch recommendations should then be followed.

Condition	Alert Level	Recommendation
<ul style="list-style-type: none"> Microcystin toxin concentration < 4 µg/L <p>And</p> <ul style="list-style-type: none"> Cyanobacteria concentration < 80,000 cells/ml 	✓ None	✓ None
<ul style="list-style-type: none"> Microcystin toxin concentration ≥ 4 µg/L to <20 µg/L <p>Or</p> <ul style="list-style-type: none"> Cyanobacteria concentration 80,000 cells/ml to < 250,000 cells/ml 	✓ Public Health Watch	<ul style="list-style-type: none"> ✓ Post Public Health Watch signage ✓ Discourage direct contact with the affected portions of the body of water ✓ Notify appropriate local health departments, healthcare providers, and veterinarians ✓ Notify public water suppliers with intakes in the affected water body as well as those with water intakes downstream of the water body ✓ Post on KDHE HAB website
<ul style="list-style-type: none"> Microcystin toxin concentration ≥ 20 µg/L to 2,000 µg/L <p>Or</p> <ul style="list-style-type: none"> Cyanobacteria concentration ≥ 250,000 cells/ml to ≤ 10,000,000 cells/ml 	✓ Public Health Warning	<ul style="list-style-type: none"> ✓ Post Public Health Warning signage ✓ Restricting direct contact with the affected body of water ✓ Notify appropriate local health departments, healthcare providers, and veterinarian ✓ Notify public water suppliers with intakes in the affected water body as well as those with water intakes downstream of the water body ✓ Issue media release
<ul style="list-style-type: none"> Microcystin toxin concentration > 2,000 µg/L <p>Or</p> <ul style="list-style-type: none"> Cyanobacteria concentration > 10,000,000 cell/ml 	✓ Recommended Lake Closure	<ul style="list-style-type: none"> ✓ Recommended that recreation cease and that picnic, camping and other public land activities adjacent to affected waters be closed


 Susan Mosier, M.D.
 Acting Secretary


 Date

APPENDIX B

Notification Signs

WATCH

Harmful Algae Possible and May be Present

Blue-Green Algae May be Harmful to Humans & Animals



Swimming, wading, and jet skiing are discouraged near visible blooms.



Keep pets & livestock away from water.

- Use caution when contacting lake water and wash with clean water afterward
- Avoid areas of algae accumulation
- Do not let people or pets eat dried algae or drink untreated water
- Clean fish well and discard guts

In case of contact with harmful algae: Call a doctor or veterinarian if people or animals have nausea, vomiting, diarrhea, rash, irritated eyes, seizures, breathing problems or other unexplained illness.

Report harmful algal blooms to Kansas Department of Health and Environment at:
www.kdheks.gov/algae-illness/
Or call: 785-296-5606

Report possible algal bloom related illness to Kansas Department of Health and Environment at:
www.kdheks.gov/algae-illness
Or call: 877-427-7317



For more information:
 Scan this code or visit
kdheks.gov/algae-illness

Posted by:

Posted on:

Kansas Department of Health and Environment, 1000 SW Jackson, Topeka, Kansas 66612, 785-296-1500 www.kdheks.gov

Example of "Watch" signage for lakes with contact recreation

WATCH

Harmful Algae Possible and May be Present

Blue-Green Algae May be Harmful to Humans & Animals



**Keep pets &
livestock away
from water.**

- Use caution when contacting lake water and wash with clean water afterward
- Avoid areas of algae accumulation
- Do not let people or pets eat dried algae or drink untreated water
- Clean fish well and discard guts

In case of contact with harmful algae: Call a doctor or veterinarian if people or animals have nausea, vomiting, diarrhea, rash, irritated eyes, seizures, breathing problems or other unexplained illness.

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Or call: 877-427-7317



For more information:
Scan this code or visit
kdheks.gov/algae-illness

Posted by:

Posted on:

Kansas Department of Health and Environment, 1000 SW Jackson, Topeka, Kansas 66612, 785-296-1500 www.kdheks.gov

Example of "Watch" signage for lakes without contact recreation

ADVERTENCIA

Presencia de algas nocivas

Las algas azul-verdosas pueden ser dañinas para los seres humanos y los animales



**Mantenga las
mascotas y
ganado lejos del
agua**

- Tenga cuidado al ponerse en contacto con el agua del lago y lávese con agua limpia después
- Evite las zonas de acumulación de algas
- No permita que otras personas o animales coman algas secas o beban agua no tratada del lago
- Limpie bien el pescado y deseche las entrañas

En caso de contacto con algas nocivas: consulte un médico o veterinario si personas o animales tienen náuseas, vómitos, diarrea, erupción cutánea, irritación de ojos, convulsiones, problemas respiratorios u otras enfermedades inexplicadas

Reporte floraciones de algas al
Departamento de Salud y Medio
Ambiente de Kansas:
www.kdheks.gov/algae-illness
O llame al: 785-296-1664

**Reporte posibles enfermedades
causadas por la floración de algas** al
Departamento de Salud y Medio
Ambiente de Kansas:
www.kdheks.gov/algae-illness
O llame al: 877-427-7317



Para obtener más
información: Escanee este
código o visite [kdhe.ks.gov/
algae-illness](http://kdhe.ks.gov/algae-illness)

Publicado
por:

Publicado
en:

Kansas Department of Health and Environment, 1000 SW Jackson, Topeka, Kansas 66612, 785-296-1500 www.kdheks.gov

Example of "Watch" signage in Spanish

WARNING

Harmful Algae Expected or Present

People & Animals May Get Sick



No water contact,
swimming, or wading



No skiing or jet skis



No pets or livestock

- If people or pets contact lake water: wash with clean, potable water afterward
- Avoid areas of algae accumulation
- Do not let people or pets eat dried algae or drink untreated water
- Clean fish well and discard guts

In case of contact with harmful algae: Call doctor or veterinarian if people or animals have nausea, vomiting, diarrhea, rash, irritated eyes, seizures, breathing problems or other unexplained illness.

Report harmful algal blooms to Kansas Department of Health and Environment at:
www.kdheks.gov/algae-illness/
Or call: 785-296-5606

Report possible algal bloom related illness to Kansas Department of Health and Environment at:
www.kdheks.gov/algae-illness
Or call: 877-427-7317



For more information:
Scan this code or visit
kdheks.gov/algae-illness

Posted by: _____

Posted on: _____

Kansas Department of Health and Environment, 1000 SW Jackson, Topeka, Kansas 66612, 785-296-1500 www.kdheks.gov

Example of "Warning" signage

ADVERTENCIA

Presencia de algas nocivas

Se pueden enfermar personas y animales



Evite el contacto con el agua,
como al nadar y vadear



Evite el esquí acuático
o el jet ski



Mantenga las mascotas y
ganado lejos del agua

- Si la gente o las mascotas se mojan con el agua del lago - lave con agua limpia tan pronto como sea posible
- Evite las zonas de acumulación de algas
- No permita que otras personas o animales coman algas secas beban agua no tratada del lago
- Limpie bien el pescado y deseche las entrañas

En caso de contacto con algas nocivas: consulte un médico o veterinario si personas o animales tienen náuseas, vómitos, diarrea, erupción cutánea, irritación de ojos, convulsiones, problemas respiratorios u otras enfermedades inexplicadas

Reporte floraciones de algas al
Departamento de Salud y Medio
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O llame al: 785-296-1664

Reporte posibles enfermedades
causadas por la floración de algas al
Departamento de Salud y Medio
Ambiente de Kansas:
www.kdheks.gov/algae-illness
O llame al: 877-427-7317



Para obtener más
información: Escanee este
código o visite kdhe.ks.gov/algae-illness

Publicado
por:

Publicado
en:

Kansas Department of Health and Environment, 1000 SW Jackson, Topeka, Kansas 66612, 785-296-1500 www.kdheks.gov

Example of "Warning" signage in Spanish

DANGER

BEACH CLOSED

Harmful Algae Present

People & Animals May Get Sick



STAY OFF OF BEACH

In case of contact with harmful algae: Call doctor or veterinarian if people or animals have nausea, vomiting, diarrhea, rash, irritated eyes, seizures, breathing problems or other unexplained illness.

Report harmful algal blooms to
Kansas Department of Health and
Environment at:
www.kdheks.gov/algae-illness/
Or call: 785-296-5606

**Report possible algal bloom
related illness** to Kansas
Department of Health and
Environment at:
www.kdheks.gov/algae-illness
Or call: 877-427-7317



For more information:
Scan this code or visit
kdheks.gov/algae-illness

Posted by: _____

Posted on: _____

Kansas Department of Health and Environment, 1000 SW Jackson, Topeka, Kansas 66612, 785-296-1500 www.kdheks.gov

Example of "Beach Closed" signage

PELIGRO

PLAYA CERRADA

Presencia de algas nocivas

Se pueden enfermar personas y animales



NO SE ACERQUE A LA PLAYA

En caso de contacto con algas nocivas: consulte un médico o veterinario si personas o animales tienen náuseas, vómitos, diarrea, erupción cutánea, irritación de ojos, convulsiones, problemas respiratorios u otras enfermedades inexplicadas

Reporte floraciones de algas al
Departamento de Salud y Medio
Ambiente de Kansas:
www.kdheks.gov/algae-illness O
llame al: 785-296-1664

Reporte posibles enfermedades
causadas por la floración de algas al
Departamento de Salud y Medio
Ambiente de Kansas:
www.kdheks.gov/algae-illness
O llame al: 877-427-7317



Para obtener más
información: Escanee este
código o visite kdhe.ks.gov/algae-illness

Publicado
por:

Publicado
en:

Kansas Department of Health and Environment, 1000 SW Jackson, Topeka, Kansas 66612, 785-296-1500 www.kdheks.gov

Example of "Beach Closed" signage in Spanish

DANGER

LAKE CLOSED

Harmful Algae Present

People & Animals May Get Sick



KEEP OUT OF LAKE

In case of contact with harmful algae: Call doctor or veterinarian if people or animals have nausea, vomiting, diarrhea, rash, irritated eyes, seizures, breathing problems or other unexplained illness.

Report harmful algal blooms to
Kansas Department of Health and
Environment at:
www.kdheks.gov/algae-illness/
Or call: 785-296-5606

**Report possible algal bloom
related illness** to Kansas
Department of Health and
Environment at:
www.kdheks.gov/algae-illness
Or call: 877-427-7317



For more information:
Scan this code or visit
kdheks.gov/algae-illness

Posted by: _____

Posted on: _____

Kansas Department of Health and Environment, 1000 SW Jackson, Topeka, Kansas 66612, 785-296-1500 www.kdheks.gov

Example of "Lake Closed" signage

PELIGRO

LAGO CERRADO

Presencia de algas nocivas

Se pueden enfermar personas y animales



NO SE ACERQUE A EL LAGO

En caso de contacto con algas nocivas: consulte un médico o veterinario si personas o animales tienen náuseas, vómitos, diarrea, erupción cutánea, irritación de ojos, convulsiones, problemas respiratorios u otras enfermedades inexplicadas

Reporte floraciones de algas al
Departamento de Salud y Medio
Ambiente de Kansas:
www.kdheks.gov/algae-illness O
llame al: 785-296-1664

Reporte posibles enfermedades
causadas por la floración de algas al
Departamento de Salud y Medio
Ambiente de Kansas:
www.kdheks.gov/algae-illness
O llame al: 877-427-7317



Para obtener más
información: Escanee este
código o visite kdhe.ks.gov/algae-illness

Publicado
por:

Publicado
en:

Kansas Department of Health and Environment, 1000 SW Jackson, Topeka, Kansas 66612, 785-296-1500 www.kdheks.gov

Example of “Lake Closed” signage in Spanish

APPENDIX C

A Week in a HAB Response

A WEEK IN HAB RESPONSE

Accounting of KDHE staff time spent on HAB response
based on a moderate to busy week during the HAB season (7 – 15 lakes)

S P O R A D I C

Occurs when complaints are received.

Complaints reviewed and validated or not by review of jar test and photos

1.5

- Complaint validation is entered into the KDHE Harmful Algae Bloom Management System (DM-003). Validation process is enacted each time a complaint is received.
- District staff is notified of the lakes that are being reported within their district office boundaries.

Personnel from district offices communicate with managers of small lakes, while central office personnel communicate with federal agency partners and lake managers.

1 – 2
hours

Communicate with complainant to notify them of response procedures activated.

0.5 hour

**Total Time:
3 to 4 hours**

M O N D A Y

Topeka staff has HAB Huddle meeting to confer on the events for that week.

0.5 hour

District staff dispatched to collect sample(s). Samples are overnighted or hand carried to Topeka Central Office.

15 – 60
hours

- Staff leaves district office as soon as possible to travel to designated lake.
- Samples collected per HAB-001.
- Staff prepare samples for shipment per protocol HAB-001.
- Samples shipped to Topeka Central Office by 1500 hours to be received on Tuesday morning in Central Office by 0900 or 0930.

**Total Time:
15 - 60**

TUESDAY

Samples received from district offices by Fed-Ex or mail.

0.5 - 1
hour

- Samples are received by 0900 or 0930.
- HAB staff receives samples and preserves sample as soon as possible to prevent degradation.
- Complete the Chain-of-Custody paperwork.
- Staff preserves samples per HAB-002 protocol.
- Part of sample must be frozen overnight for lysing of cells in order to complete ELISA testing on Wednesday.

Update HAB Management System per DM-003 protocol.

0.5 - 1
hour

Total Time:
1 - 2 hours

WEDNESDAY

Samples for ELISA tests are run for toxins. Any high concentrations are diluted and run again.

1.5 - 3
hours

- Samples are pulled from freezer and allowed to thaw at room temperature.
- ELISA kits are also pulled out of refrigerator to warm to room temperature.
- Per HAB-003 protocol- ELISA toxicity tests run and diluted as needed.

Preserved sample in Lugol's is prepared for scope work and the algal taxa are identified and enumerated.

7 - 15
hours

- Preserved samples are prepared for scope work on a covered slide and allowed to settle for approximately 30 minutes.
- Enumeration and identification is completed by randomly selecting 50 positions along a grid viewed in the ocular of the scope.

Data from cell enumeration and toxin analyses are entered into Oracle database (DM-002 protocol)

0.5 - 1
hour

Total Time:
10 to 20

THURSDAY

When there are many samples for cell enumeration, taxa analysis may continue into Thursday.

Prepare for stakeholder meeting

1.5 - 3 hours

- Pull analysis data from Oracle into HAB Management App (per DM-003).
- Make report of week's sampling results.
- Determine following week's sampling load.

3:00 pm Stakeholder meeting; all partners in

0.5 - 1 hour

x 15 staff

= 7 - 15 hours

- Analysis results are emailed to HAB Stakeholders and other people interested in the waterbody after 12:30 p.m. for the phone conference held at 3:00 p.m.
- Suggestions on lake status for lake managers are discussed during the meeting.

Update public outlets of information

1.5 hours

- Update status of lakes in HAB Management System; data is viewable online (per DM-003).
- Update website
- Update message on HAB hotline
- Press release distributed

**Total Time:
10 to 20**

FRIDAY

Update season's statistics.

0.5 - 1 hour

Send sampling tasks to district offices using HAB Management System (DM-003).

0.5 - 1 hour

**Total Time:
1 to 2 hours**

**TOTAL WEEKLY STAFF TIME
~40 TO 110 HOURS**

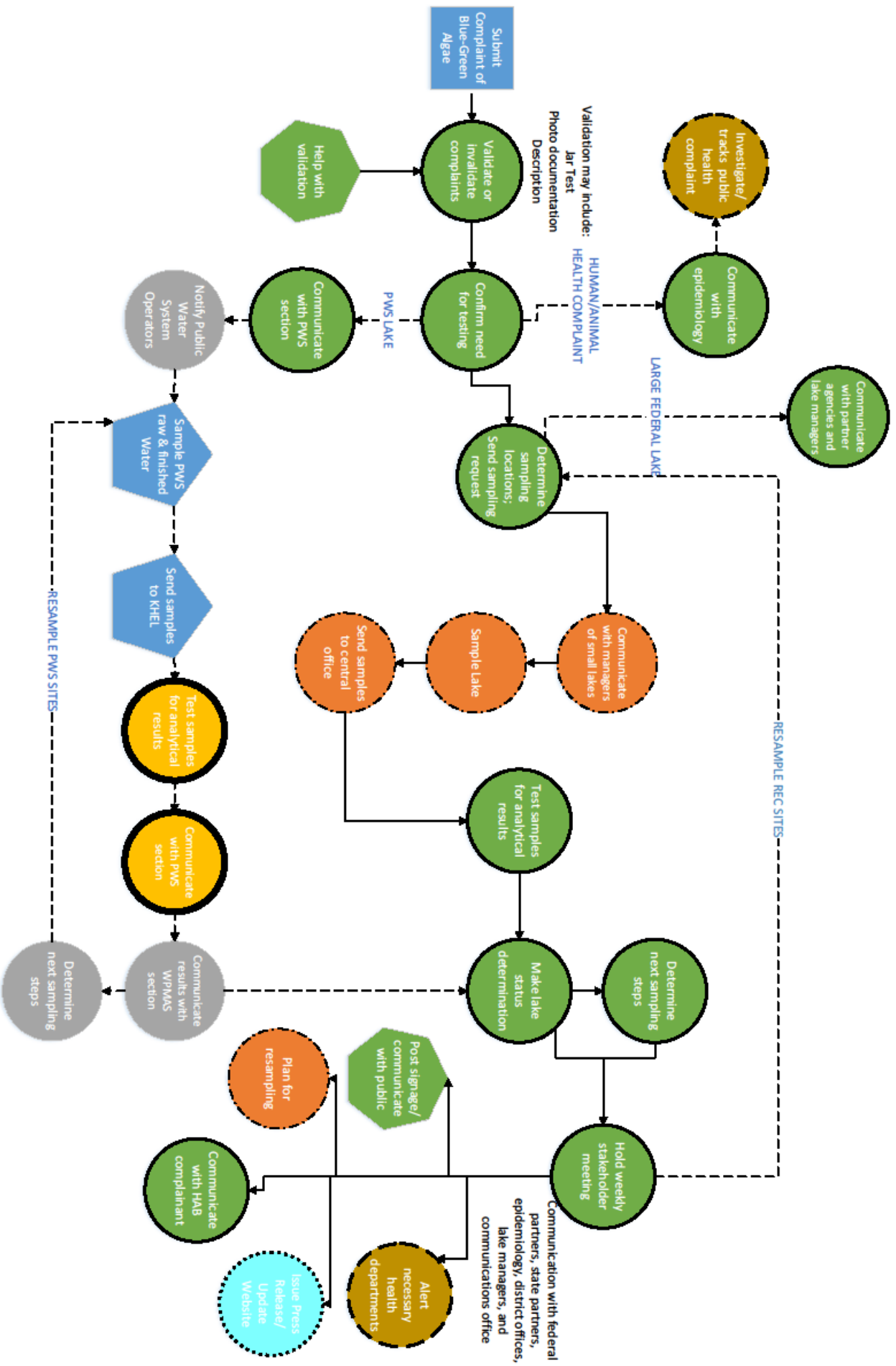
APPENDIX D

KDHE's Harmful Algal Bloom Response Procedures Flow Chart

KEY

KDHE





APPENDIX E

Algae Submission Form/ Chain of Custody

Algae Sample Submission Form (Reproduce as needed for each sample)

Send this form with samples to:

Watershed Planning, Monitoring, and Assessment Section
 Kansas Department of Health and Environment
 1000 SW Jackson Ave., Suite 420 (Curtis State Office Building)
 Topeka, Kansas 66612-1367

NOTE: Use cubetainers with no preservatives for algae (leave some airspace in cubetainer).
 If multiple sites are sampled for algae, submit more than one cubetainer.
 If submitting aquatic plants, use a ziplock bag with only a tiny amount of water in the bag.
 Ship them ASAP using only a small amount of ice (too cold can damage some species).

Lake/Waterbody Name Include LM Number and Suffix Example: Central Park Lake LM0609 Collector, Date, Time	Check which type(s) of problem are being investigated: <input type="checkbox"/> Blue-Green Bloom <input type="checkbox"/> Taste/Odor Incident <input type="checkbox"/> Aesthetic Complaint <input type="checkbox"/> Livestock/Pet Kill <input type="checkbox"/> Other (briefly describe in space to left) Check type of waterbody samples collected from: <input type="checkbox"/> Lake/Pond <input type="checkbox"/> Stream/River <input type="checkbox"/> Other (briefly describe in space to left)
---	--

If this is a taste/odor incident, please provide any additional data related to the treatment plant, weather, etc.

Also check the boxes appropriate to the qualities of the "taste" and "odor" of the finished or raw water.
 ("raw" or "finished" can be put in the appropriate field)

Odor: <input type="checkbox"/> Earthy/Musty <input type="checkbox"/> Chlorinous <input type="checkbox"/> Grassy/Woody <input type="checkbox"/> Marshy/Septic <input type="checkbox"/> Fragrant/Flowery <input type="checkbox"/> Fishy/Aquarium <input type="checkbox"/> Medicinal <input type="checkbox"/> Hydrocarbon/Chemical	Taste: <input type="checkbox"/> Sour/Acidic <input type="checkbox"/> Salty <input type="checkbox"/> Bitter <input type="checkbox"/> Sweet <input type="checkbox"/> Mouthfeel _____ "Mouthfeel" covers a number of characteristics of sensation, such as "powdery," "metallic," "burning," etc. Please indicate the type of mouthfeel to the right.
--	---

If this is not a taste/odor incident (i.e., fishkill, bloom, etc.), please indicate any other data or information related to the incident (including field conditions, other chemical data, current and preceding weather, etc.). If chemical data are sent to KHEL, please copy Pattie Haines-Lieber, BEFS, on these.

On the back of this form, please include a sketch map of the site.

Edited 3/2019

_____ Location	
_____ GPS Coordinates	_____ GPS Unit Type
_____ PHL	

Sketch map of site

Chain of Custody:

Date _____	Relinquished By _____	Received By _____
Date _____	Relinquished By _____	Received By _____
Date _____	Relinquished By _____	Received By _____
Date _____	Relinquished By _____	Received By _____

Additional Reports Routed To:

Name _____	Address _____
Name _____	Address _____
Name _____	Address _____

Example of Algae Submission/Chain of Custody form - back

Kansas
Department of Health
and Environment
www.kdheks.gov

**Environmental Chain of
Custody Form**

Client:	Location Name:	Additional Report Recipients	
Profile:	Collector:	To	To
Location Code:	Event Desc:	Address	Address
Notes:		Known Hazards	
		Flammable	Poison
		Radiological	Other

#	Sample ID, Description	Matrix	Collection		Sample Comments	Analyses	Total number of containers	Field Test Results					
			Actual Collection					Flammable	Radiological	Poison	Other		
			Date	Time									
1													
2													
3													
4													
5													
6													
7													
8													

Transfers	Released By	Date/Time	Received By	Date/Time	Sample Condition		Receipt Temperature:
					Received on Ice	Samples Intact	
1					Y	N	Y
2					Y	N	Y
3					Y	N	Y

CHEMWARE
2001.1.0.0

Example of Laboratory Algae Submission/Chain of Custody form - front

Environmental Chain of Custody Form KEY

- **Client:** Please pick one of the following – BER Remedial Section, BER Storage Tanks Section, BER Assessment & Restoration Section, BER Surface Mining Section, BOW-Geology, BOW-Industrial Programs, BOW-Livestock Management, BOW-Technical Services, BOW-Watershed Management Section, BOW-Watershed Planning, NW District Office, NE District Office, NC District Office, SW District Office, SE District Office, SC District Office, BWM-Hazardous Waste Programs, BWM-Solid Waste Programs
- **Profile:** Please pick one of the following, which corresponds to client chosen above – State Cooperative Program, USDA Program, Voluntary Cleanup Program, EUC Program, Site Assessment Program, State Water Plan Program, Brownfields Program, Special Projects, Public Water Supply Unit, Monitoring Unit, LUST Unit, Remedial Unit, Federal Facilities, Spill Response Program, Dry Cleaning Program, Superfund Program, General ARS, NRDP Program, Abandoned Mine Land Program, Active Mining Program, General Programs, Underground Brine Injection, Pre-treatment Programs, Livestock Special Projects, Livestock Ground Water Projects, Waste Effluent, Waste Influent, Chlorinated PWS, Distribution Systems, Point of Entry, Test Source, Supply Source, Private, Sanitary Program, Effluent Monitoring, Non-point pollution Monitoring, Pollution Investigations, Stream Chemistry, Stream Probabilistic, Lakes Monitoring WRAPS, TMDL, Biology Monitoring
- **Location Code:** Please include project code (e.g. C5-123-1234) as desired on final Report of Analysis. There is a 20-character limit.
- **Location Name:** Please include location name desired on final Report of Analysis.
- **Collector:** Please include collector name desired on final Report of Analysis.
- Event Desc:** Leave blank.
- Additional Report Recipients:** Please include names and email addresses of additional report recipients desired.
- **Sample-ID:** Please include unique sample identifier for each sample.
- **Matrix:** Please pick one of the following for each sample – DW-Drinking Water; W-Water; WW-Waste Water; SO-Soil; SL-Solid; or SD-Sediment
- **Actual Collection Date/Time:** Please include actual collection date and time (military format) for each sample.
- **Analyses:** Please pick from the following analyses available in the KHEL Environmental Test Catalog – AF Alpb/Bet, AF Gamma, PWS Met, S 8080Pest, S 8260 VOC, S Bromide, S Gamma, S ICP Met, S Mercury, S Nitrate, S RCRA Met, S RCRAAnoHg, S TCLP Met, S TKN, W 608Pest, W 8260 VOC, W Alpb/Bet, W BOD, W Bromide, W COD, W Conduct, W DO, W Gamma, W Hardness, W ICP Met, W Mercury, W Mineral, W Nitrate, W Nutrient, W RCRA Met, W RCRAAnoHg, W Ra226, W Ra228, W Strontiu, W TCLP Met, W TDS, W TKN, W TOC, W TSS, W Tritium, W Turbid, W Uranium
- ** REQUIRED data for sample submission; all other fields are optional.**

APPENDIX F

Public Water Supply

2019 Kansas Public Water Supply Harmful Algal Bloom Seasonal Monitoring Program Guide

The Kansas Public Water System (PWS) Harmful Algal Bloom (HAB) Seasonal Monitoring Program is a voluntary program for Water Supply Systems to participate in, which provides consistent proactive monitoring for potential toxins through the HAB bloom season. It is intended to provide water systems with important information, so that treatment processes can be modified, or other measures taken to assure safe drinking water is provided to their customers. Early detection will also allow for timely notification to customers should an event occur.

This Guide provides guidelines on Harmful Algal bloom (HAB) monitoring and sampling periods and protocols, identifies acceptable analytical methods, and identifies cyanotoxin levels that will be used to make advisory decisions and consistent monitoring protocol for public water systems.

Human Health Effects of Cyanotoxins

Adverse health outcomes from exposure to cyanotoxins may range from a mild skin rash to serious illness or death. Acute illnesses caused by exposure to cyanotoxins have been reported, and after short-term exposures, microcystin and cylindrospermopsin could cause liver and kidney damage. The table below summarizes the health effects caused by the most common toxin producing cyanobacteria. The below table is taken from the EPA Health and Ecological Effects website at: [https://www.epa.gov/nutrient-policy-data/health-and-ecological-effects-with Saxitoxin information added from the World Health Organization \(WHO\)](https://www.epa.gov/nutrient-policy-data/health-and-ecological-effects-with-Saxitoxin-information-added-from-the-World-Health-Organization-(WHO)). [Note: most planktonic *Anabaena* have now been placed into the genus *Dolichospermum*]

Cyanotoxins	Acute Health Effects in Humans	Most common cyanobacteria producing toxin
Microcystin-LR	Abdominal pain, Headache, Sore throat, Vomiting and nausea, Dry cough, Diarrhea, Blistering around the mouth, and Pneumonia	<i>Microcystis</i> , <i>Anabaena</i> , <i>Nodularia</i> , <i>Planktothrix</i> , <i>Fischerella</i> , <i>Nostoc</i> , <i>Oscillatoria</i> , and <i>Gloeotrichia</i>
Cylindrospermopsin	Fever, Headache, Vomiting, Bloody diarrhea	<i>Cylindrospermopsis raciborskii</i> , <i>Aphanizomenon flos-aquae</i> , <i>Aphanizomenon gracile</i> , <i>Aphanizomenon ovalisporum</i> , <i>Umezakia natans</i> , <i>Anabaena bergii</i> , <i>Anabaena lapponica</i> , <i>Anabaena planctonica</i> , <i>Lyngbya wollei</i> , <i>Raphidiopsis curvata</i> , and <i>Raphidiopsis mediterranea</i>
Anatoxin-a group	Tingling, burning, numbness, drowsiness, incoherent speech, salivation, respiratory paralysis leading to death*	<i>Chrysosporum</i> (<i>Aphanizomenon</i>) <i>ovalisporum</i> , <i>Cuspidothrix</i> , <i>Cylindrospermopsis</i> , <i>Cylindrospermum</i> , <i>Dolichospermum</i> , <i>Microcystis</i> , <i>Oscillatoria</i> , <i>Planktothrix</i> , <i>Phormidium</i> , <i>Anabaena flos-aquae</i> , <i>A. lemmermannii</i> , <i>Raphidiopsis mediterranea</i> (strain of <i>Cylindrospermopsis raciborskii</i>), <i>Tychonema</i> and <i>Woronichinia</i>
Saxitoxin	In severe poisoning, illness typically progresses rapidly	Marine dinoflagellates, cyanobacteria in the genera <i>Anabaena</i> , <i>Aphanizomenon</i> ,

Cyanotoxins	Acute Health Effects in Humans	Most common cyanobacteria producing toxin
	and may include gastrointestinal (nausea, vomiting) and neurological (cranial nerve dysfunction, a floating sensation, headache, muscle weakness, parasthesias and vertigo) signs and symptoms. Respiratory failure and death can occur from paralysis	<i>Planktothrix</i> , <i>Cylindrospermopsis</i> , <i>Lyngbya</i> and <i>Scytonema</i> (Smith et al., 2012; Wiese et al., 2012).

* Symptoms observed in animals.

Numerical Cyanotoxin Thresholds for Drinking Water Health Advisories

In 2015, EPA developed Health Advisories (HA) for the two cyanobacterial toxins. These thresholds will be used to determine when a public health advisory will be issued for a detection of cyanotoxins in finished drinking water. These HAs are not regulations and should not be construed as legally enforceable federal standards. HAs may change as new information becomes available.

Cyanotoxin	Drinking Water Health Advisory (10-day)	Drinking Water Health Advisory (10-day)
	Bottle-fed infants and pre-school children	School-age children and adults
Microcystins	0.3 µg/L	1.6 µg/L
Cylindrospermopsin	0.7 µg/L	3 µg/L
Anatoxin-A	*	*
Saxitoxin	*	*

**A few States have determined their own guidance/action levels for Anatoxin-A and Saxitoxin. However, Kansas will continue to follow EPA's Guidance. From:*

<https://www.epa.gov/nutrient-policy-data/guidelines-and-recommendations>

Kansas PWS Proposed Monitoring Plan – (Surface Water Sources Only)

1. Monitoring Season will run May 1, 2019 through October 31, 2019.
2. PWS will conduct initial microcystins monitoring for both raw and finished water during May 2019.
3. If no microcystins are detected, the PWS would begin weekly monitoring of raw water at water intake only (i.e. the same location as LT2 Samples are collected or water intake structure)
4. If microcystins are detected in the raw water, Contact KDHE PWS-Section immediately (contact information listed below). PWS will then collect a paired raw and finished water microcystins samples within 24 hours of receiving the positive results and complete analysis within five days.
5. Depending on the microcystins levels detected, KDHE may instruct PWS to continue weekly monitoring or request increased testing of raw and/or finished water. Modifications to water treatment process may be recommended to remove toxins.
6. PWS will continue with weekly paired raw and finished water microcystins monitoring until results are below the HA for at least two consecutive weeks or as recommended by KDHE.
7. The KDHE PWS Section will subsidize the cost for monitoring. The current estimated cost for laboratory analysis is approximately \$100.00 per sample. The cost to your PWS system will be no more than \$25.00 per sample. This cost may be lower depending upon the number of participating PWS systems.
8. PWS systems that choose not to participate in the voluntary routine monitoring program will still be eligible to use Kansas Health and Environmental Laboratories (KHEL) for special samples if a HAB occurs in their source water, however there may delays in sample collection due to sample bottle scheduling and shipping and the cost is estimated at \$75.00 per sample.

KDHE PWS HAB Contact Information

Questions regarding KDHE monitoring for public water supplies or to report possible Hazardous Algal Bloom or positive test results contact:

During Normal Business Hours (8:00 to 5:00pm, M-F):

Robert Gavin, Ph. 785-296-0643, rob.gavin@ks.gov

Amelia Springer, Ph. 785-296-5523, amelia.springer@ks.gov

Cathy Tucker-Vogel, Ph. 785-368-7130, cathy.tucker-vogel@ks.gov

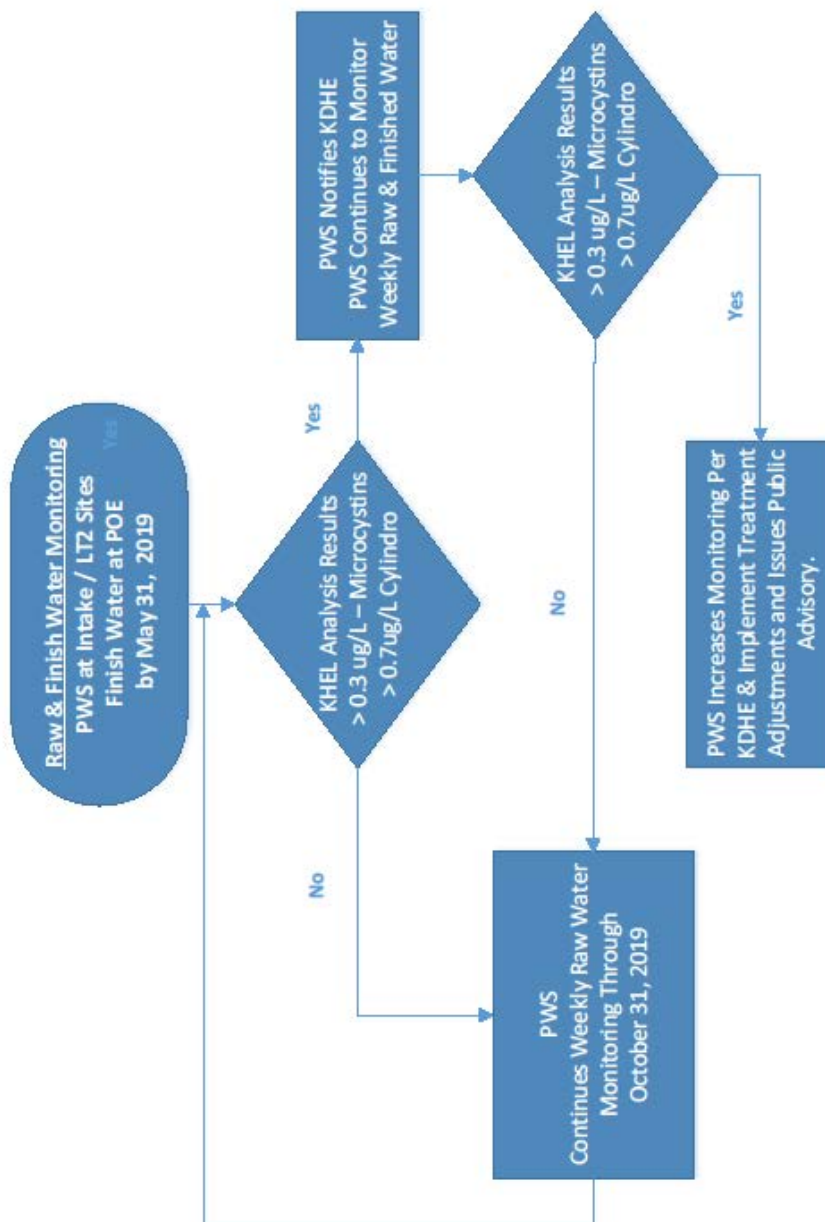
After Hours or Weekend/ Holidays contact (24/7):

KDHE Spill Hotline, 785-296-1679

For additional information related to cyanotoxins management for public water supply systems please refer to the following Environmental Protection Agency Website:

<https://www.epa.gov/ground-water-and-drinking-water/cyanotoxins-drinking-water>

2019 PWS-KDHE Voluntary HAB Monitoring Program Flow Diagram



Public Notification Procedure

Public notification for total microcystins will be conducted in accordance with the provisions contained in this section. Should an exceedance of the 2015 EPA Health Advisory occur in the finished water or distribution system samples, Contact KDHE PWS-Section immediately. KDHE will assist the PWS to issue an immediate Tier 1 public Advisory (24-hour notification) informing all customers of the situation. If requested, a public notice template may be provided by KDHE containing the appropriate health effects language and use restrictions.

The geographic area under public notification may be limited based on distribution sample results and provisions described in the system's written contingency plan. Distribution sampling results may also be a consideration when modifying use restrictions or lifting the advisory.

Contingency Planning

KDHE encourages public water systems to work with KDHE, their local emergency management agency, and local health departments to develop a coordinated response to cyanotoxin detections in finished water above EPA designated health advisory Levels. A detailed response protocol should be included in the contingency plans of those PWSs using surface water sources susceptible to a harmful algal bloom.

Items the water system should address in their contingency plan include a communication strategy, including 24-hour emergency contacts, identification of critical users/possible susceptible populations, and considerations for water restrictions or connections to a backup water system. KDHE can provide additional guidance if requested.

Helpful Links for PWS

Managing Cyanotoxins in Public Drinking Water Systems

<https://www.epa.gov/ground-water-and-drinking-water/managing-cyanotoxins-public-drinking-water-systems>

Drinking Water Cyanotoxin Risk Communication Toolbox

<https://www.epa.gov/ground-water-and-drinking-water/drinking-water-cyanotoxin-risk-communication-toolbox>

Cyanotoxin tools -Management Plan Template

<https://www.epa.gov/ground-water-and-drinking-water/what-cyanotoxin-tools-are-available-public-water-systems>

Ohio EPA HAB Website

<https://epa.ohio.gov/ddagw/HAB>

Kansas Environmental Chain of
Custody Form

Department of Health
Division of Environmental Health

Revised 07/2008 Version 2.0

Client:		Location Name:		Notes:		Additional Report Recipients	
Profile:		Collector:				To	
Location Code:		Event Desc:				Address	
						Address	
						Known Hazards	
						Flammable	
						Radiological	
						Poison	
						Other	

#	Sample ID, Description	Matrix	Collection		Actual Collection	Time	Sample Comments	Analytes	Total number of containers	Field Test Results	
			Date	Time						Flammable	Radiological
1											
2											
3											
4											
5											
6											
7											
8											

Transfers	Released By	Date/Time	Received By	Date/Time	Sample Condition		Receipt Temperature:
					Received on Ice	Samples Intact	
1					Y	N	Y
2					Y	N	Y
3					Y	N	Y

CHEMWARE
2001.1.0.0

Front of Form

Environmental Chain of Custody Form KEY

- **Client:** Please pick one of the following – BER Remedial Section, BER Storage Tanks Section, BER Assessment & Restoration Section, BER Surface Mining Section, BOW-Geology, BOW-Industrial Programs, BOW-Livestock Management, BOW-Technical Services, BOW-Watershed Management Section, BOW-Watershed Planning, NW District Office, NE District Office, NC District Office, SW District Office, SE District Office, SC District Office, BWM-Hazardous Waste Programs, BWM-Solid Waste Programs
- **Profile:** Please pick one of the following, which corresponds to client chosen above – State Cooperative Program, USDA Program, Voluntary Cleanup Program, EUC Program, Site Assessment Program, State Water Plan Program, Brownfields Program, Special Projects, Public Water Supply Unit, Monitoring Unit, Lust Unit, Remedial Unit, Federal Facilities, Spill Response Program, Dry Cleaning Program, Superfund Program, General ARS, NRD Program, Abandoned Mine Land Program, Active Mining Program, General Programs, Underground Brine Injection, Pre-treatment Programs, Livestock Special Projects, Livestock Ground Water Projects, Waste Effluent, Waste Influent, Chlorinated PWS, Distribution Systems, Point of Entry, Test Source, Supply Source, Private, Sanitary Program, Effluent Monitoring, Non-point pollution Monitoring, Pollution Investigations, Stream Chemistry, Stream Probabilistic, Lakes Monitoring WRAPS, TMDL, Biology Monitoring
- **Location Code:** Please include project code (e.g. C5-123-1234) as desired on final Report of Analysis. There is a 20-character limit.
- **Location Name:** Please include location name desired on final Report of Analysis
- **Collector:** Please include collector name desired on final Report of Analysis.
- Event Desc:** Leave blank.
- Additional Report Recipients:** Please include names and email addresses of additional report recipients desired.
- **Sample ID:** Please include unique sample identifier for each sample.
- **Matrix:** Please pick one of the following for each sample – DW-Drinking Water; W-Water; WW-Waste Water; SO-Soil; SL-Solid; or SD-Sediment
- **Actual Collection Date/Time:** Please include actual collection date and time (military format) for each sample.
- **Analyses:** Please pick from the following analyses available in the KHEL Environmental Test Catalog – AF Alp/Bet, AF Gamma, PWS Met, S 8080Pest, S 8260 VOC, S Bromide, S Gamma, S ICP Met, S Mercury, S Nitrate, S RCRA Met, S RCRAnoHg, S TCLP Met, S TKN, W 6080Pest, W 8080Pest, W 8260 VOC, W Alph/Bet, W BOD, W Bromide, W COD, W Conduct, W DO, W Gamma, W Hardness, W ICP Met, W Mercury, W Mineral, W Nitrate, W Nutrient, W RCRA Met, W RCRAHg, W Ra226, W Ra228, W Strontiu, W TCLP Met, W TDS, W TKN, W TOC, W TSS, W Tritium, W Turbid, W Uranium
- ** REQUIRED data for sample submission; all other fields are optional.**

APPENDIX G

Public Health Release Example

Office of the Secretary
Curtis State Office Building
1000 SW Jackson St., Suite 540
Topeka, KS 66612-1367



Phone: 785-296-0461
www.kdheks.gov

Lee A. Norman, M.D., Acting Secretary

Laura Kelly, Governor

For Immediate Release

October 11, 2018

For more information, contact:

Gerald Kratochvil

Communications Director

Kansas Department of Health and Environment

Gerald.Kratochvil@ks.gov

785-296-1317

Ron Kaufman

Director, Information Services Division

Kansas Department of Wildlife, Parks and Tourism

Ron.Kaufman@ks.gov

785-296-2870

Public Health Warning Issued for Kansas Lakes Due to Harmful Algal Blooms Watch or Warning lifted on three lakes

TOPEKA – The Kansas Department of Health and Environment (KDHE), in conjunction with the Kansas Department of Wildlife, Parks and Tourism (KDWP), has issued public health warnings for some Kansas lakes for the upcoming weekend and week.

If a lake is under a public health warning for blue-green algae, activities such as boating and fishing may be safe. However, direct contact with water (*i.e.*, wading, skiing, and swimming) is strongly discouraged for people, pets, and livestock.

The following waterbodies are currently under a public health advisory:

- **Warning:** Carbondale West Lake, Osage County
- **Warning:** Frazier Lake, Grant County
- **Warning:** Hodgeman County SFL, Hodgeman County
- **Watch:** Lakewood Park Lake, Saline County
- **Watch:** Mary's Lake, Douglas County
- **Watch:** Overbrook City Lake, Osage County
- **Watch:** Overbrook City Kids Pond, Osage County

The following have had their advisories lifted:

- Atchison Co. Park Lake, Atchison County
- Atchison Co. SFL, Atchison County
- Central Park Lake (Pond), Shawnee County

Protect and Improve the Health and Environment of all Kansans

There are three levels of public health advisory for Harmful Algal Blooms; these are Watch, Warning, and Closure. All current advisories are posted at: www.kdheks.gov/algae-illness/index.htm, along with further information about Harmful Algal Blooms.

A **Closure** or Closed status indicates that conditions are extremely dangerous for humans and pets. Harmful algal toxins and cell counts are at dangerously high levels. Any kind of contact with the waterbody is prohibited.

Lakes under a **Warning** are not closed. Marinas, lakeside businesses and park camping facilities are open for business. If swim beaches are closed, it will be specifically noted. Drinking water and showers at parks are safe and not affected by algae blooms. Boating and fishing are safe on lakes under a warning, but contact with the water should be avoided. Hands should also be washed with clean water after handling fish taken from an affected lake. Zoned lakes may have portions fully open for all recreation even if other portions are under a warning.

A **Watch** status indicates that blue-green algae have been detected on the waterbody and a Harmful Algal Bloom is possible or may be present. Avoid areas of algae accumulation, and keep pets and livestock away from the water.

Kansans should be aware that blooms are unpredictable. They can develop rapidly and may move around the lake, requiring visitors to exercise their best judgment. If there is scum or paint-like surface, or if the water is bright green, avoid contact and keep pets away. These are indications that a harmful bloom may be present. Pet owners should be aware that animals that swim in or drink water affected by a harmful algal bloom or eat dried algae along the shore may become seriously ill or die.

When a warning is issued, KDHE recommends the following precautions be taken:

- Lake water is not safe to drink for pets or livestock.
- Lake water, regardless of blue-green algae status, should never be consumed by humans.
- Water contact should be avoided.
- Fish may be eaten if they are rinsed with clean water and only the fillet portion is consumed, while all other parts are discarded.
- Do not allow pets to eat dried algae.
- If lake water contacts skin, wash with clean water as soon as possible.
- Avoid areas of visible algae accumulation.

KDHE samples publicly accessible waterbodies for blue-green algae when the agency receives reports of potential algae blooms in Kansas lakes. Based on sampling results, KDHE reports on potentially harmful conditions.

For information on blue-green algae and reporting potential harmful algal blooms or algae related illness, please visit www.kdheks.gov/algae-illness/index.htm.

###

APPENDIX H

Jar and Stick Tests

The Jar and Stick Tests

Option for testing your pond:

There are a couple of simple tests that a pond owner can do, at no cost, to determine if a green pond even has a blue-green algae community, or if any algal material visible at the water surface is a blue-green surface scum.

NOTE: No test is 100% perfect, and that includes the jar test for blue-greens. The test relies on the buoyancy adaptation of most free-floating (planktonic) blue-green algae. In Kansas, bloom complaints are overwhelmingly the result of the forms that are buoyant. However, there is a small possibility (<2%) that the algae in your particular test happen to be non-buoyant species for blue-greens, resulting in a false negative test. Likewise, some swimming forms of non-blue-green algae (like Euglenoids) may form a surface layer during a jar test, resulting in a false positive. Fortunately, most *Euglena* blooms will be reddish in color rather than green, allowing for their identification. Although the jar test does provide a quick and inexpensive way to confirm whether you have a blue-green community in your lake, it does not tell you what species are present, nor does it tell you whether they are actually producing toxins. Be aware, too, that just having blue-green algae present does not mean your pond is automatically hazardous. Many lakes and ponds in Kansas typically have blue-green algae in them. Hazardous conditions occur when the number of blue-green algae is large, and composed of species capable of generating toxins. For that information, a microscopic examination of the water, combined with a chemical test for toxins, would be required for a more complete picture.

The Kansas Department of Health and Environment only tests samples from public waterbodies. Kansas State University can assist you issues regarding private waterbodies. If you are conducting one or both of these tests on your private farm pond or lake and you determine that you do have a blue-green bloom occurring in your pond, you may obtain further assistance by going to this website:

http://www.kdheks.gov/algae-illness/private_waters.htm

THE JAR TEST PROCEDURE

Purpose

Look out over the pond and see if the water looks very green. To decide whether the “green” is blue-green algae in the pond, or just an overabundance of some of the more beneficial types of planktonic algae, a simple test can be conducted called the “jar test.”

Follow this step by step process to make an initial assessment of the pond in question.

Materials

- Clear jar (pint to quart size) – A Mason (canning) jar or a store-bought pickle jar with the label removed works well.
- Rubber or latex gloves.
- Plastic bag or other containment device

Procedure

1. Find an appropriate clear glass jar with a screw top lid.
2. For safety reasons, use rubber or latex gloves to collect a sample of water from the pond in question to prevent skin exposure.
3. Collect the water just below the surface of the water.
 - a. DO NOT collect sample directly from the surface but collect just under the surface to avoid collecting just the scum on the top layer of the water.
4. Fill the jar about $\frac{3}{4}$ of the way full with the pond water. (See Photo 1.)
 - (DO NOT fill the jar completely to the top. Algae will give off gases and may cause of buildup of pressure inside the jar causing it to break.)

Photo 1 – Initial Samples



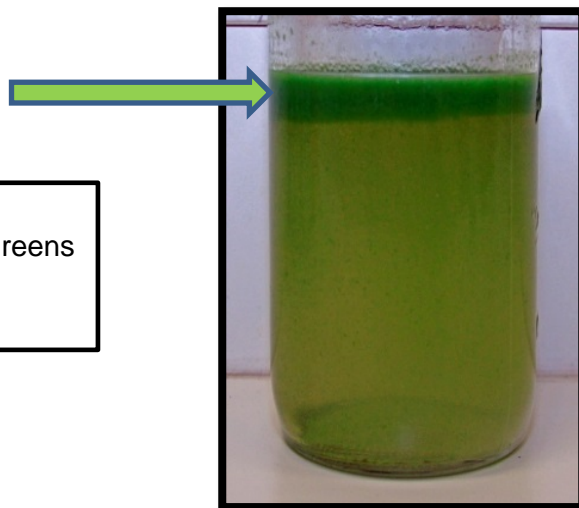
5. Wipe off any scum that may be on the outside of the jar.
6. Screw the lid onto the jar.
7. Be aware that the jar may be contaminated with any toxins present in the water. To avoid contamination of other surfaces, place the jar in a plastic bag or other containment device.
8. Place the jar in a cold refrigerator and leave it completely undisturbed overnight.
9. The next day, **carefully** remove the jar from the refrigerator and look to see where the algae have accumulated.
 - a. **IT IS VERY IMPORTANT** that you do not shake or agitate the jar in any way. If you do, this will mix the algae into the water again and you will not get usable test results.
9. If the algae are all settled out near the bottom of the jar, then that is a likely indication that the lake does not have a lot of blue-green algae growing in it. (See arrow on Photo 2.)

Photo 2 – NO - Blue-greens
(Negative)



If the algae have formed a green ring around the top of the water in the jar, or just seem to be collected at the air/water divide, there is a strong possibility that the pond does have a blue-green algae community present. (See arrow on Photo 3.)

Photo 3 – YES - Blue-Greens
(Positive)



THE STICK TEST PROCEDURE

Purpose

Look out over the pond and see if a mat of green material is floating on the surface. Is it blue-green algae forming a surface scum, or is it a mat of floating filamentous green algae (often called “fisherman’s moss” or “string algae”)? A simple test to determine what the material might be is called the “stick test.”

Materials

- Sturdy stick – Make sure it is long enough to reach into the water without getting algae on your hands.
- Rubber or latex gloves

Procedure

1. Find a sturdy stick.
2. Put rubber or latex gloves on before attempting to retrieve a sample of the green material from the pond to prevent skin exposure.
3. Thrust the stick into the surface mat and slowly lift out of the water.
 - a. Make sure you do not fall into the water while attempting to retrieve material.
4. Look at the end of the stick to see what came out of the water.
 - a. If the stick comes out looking like it has been thrust into a can of paint, the mat on the pond is likely to be a blue-green algae scum.
 - b. If the stick pulls out strands that look like green hair or threads, the mat on the pond is likely filamentous green algae. (Although filamentous green algae can be a nuisance when over-abundant, they do not pose a danger to your health.) (See Photo 1.)

Photo 1 - Filamentous algae



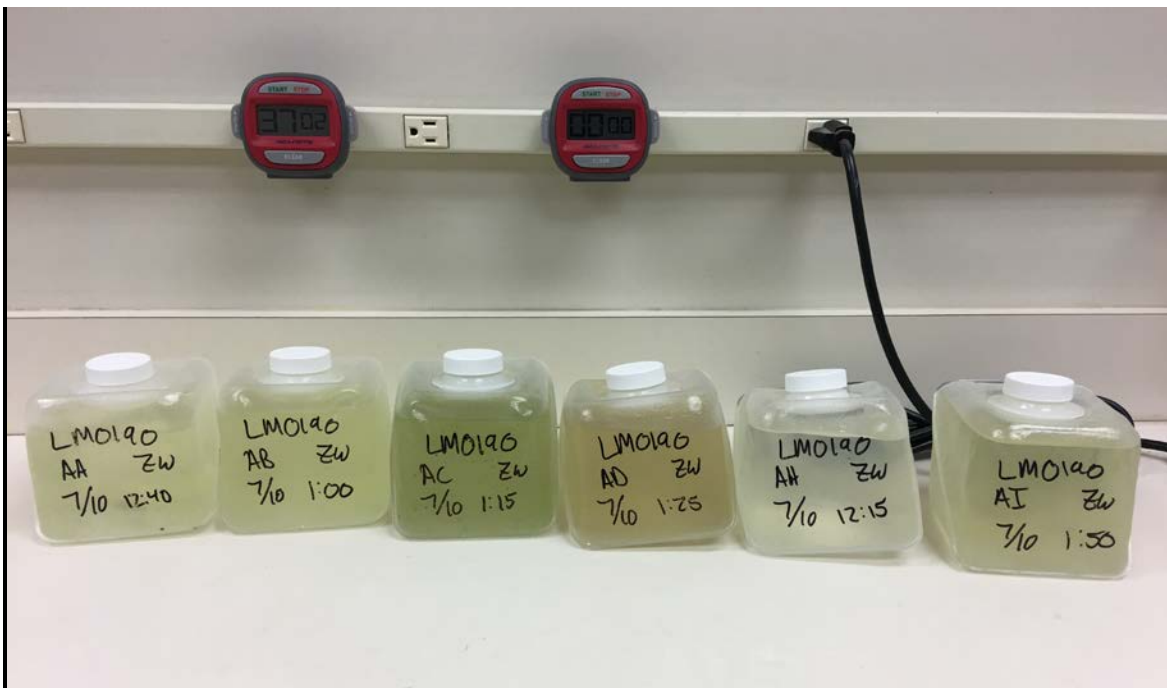
Note: The stick test can fail when a particular type of blue-green alga is present. This type of algae is called *Lyngbya wollei*. This species of blue-green algae can form tough filamentous mats that float to the surface, similar to the mats formed by harmless filamentous green algae. However, *Lyngbya wollei* typically will have a very putrid sewage-like odor, which filamentous green algae do not. *Lyngbya wollei* mats also will often release a purple pigment in the water around them, which is something filamentous algae do not do. (See Photo 2.)



Photo 2 - *Lyngbya wollei*

APPENDIX I

Taxonomic Analysis Priority



In each picture shown above, the samples were from different sampling locations in one lake. In this instance, KDHE will test all samples for their levels of microcystin. In cases of limited resources, KDHE may choose the sample with the appearance of the highest level of blue-green algae for taxonomic (cell count) analysis. If it is difficult to tell visually which sample has the most blue-green algae, KDHE will use best professional judgement to determine which sample is likely to have the most negative impact on human health. Data informing this decision could be the importance of the location for human health, wind conditions during sampling, reporting from the field, photographic evidence, jar test results, or previous analysis results.

APPENDIX J

Standard Operating Procedures for Algal Samples

<u>Procedure</u>	<u>Last Revised</u>
Protocol for Algal Sample Collection (HAB-001)	03/30/19
Initial Processing of Algal Samples (HAB-002)	02/27/15
Microcystin Testing Using ELISA Qualitube Kit ET-022 (HAB-003)	03/30/19

PROTOCOL FOR ALGAL SAMPLE COLLECTION (HAB-001)

I. INTRODUCTION

A. Purpose

The following paragraphs describe the procedures for the collection, preservation, and transport of algal samples from water bodies with a validated HAB complaint.

B. Minimum Staff Qualifications

Personnel implementing this SOP should be an employee of KDHE or a partner agency who has had training/experience in ambient water sampling and field measurement. They must also receive training from KDHE personnel for HAB sample collection protocols.

C. Equipment/Accessories

1. Cubitainers – 1 per sample location
2. Amber Glass (TOC), Non-Preserved Bottle – 1 per BA sample station (“BA” stations are those associated with raw water intakes for Public Water Supplies)
3. Nutrient Bottle - 1 per HAB event (when nutrient samples are requested)
4. Waterproof permanent marker
5. Pole sampler with attached plastic beaker
6. GPS unit
7. Paper Towels
8. Cooler
9. Cold packs or ice
10. Zip lock plastic bags for ice if needed
11. Tap or distilled water
12. Large trash bags
13. Map of area

II. PROCEDURES

A. Collection of Algal Samples - (one cubitainer per site)

1. Using a pole sampler with an attached beaker, either a “grab” or “composite” sample can be collected.

a. “Grab” Samples:

- 1) Verify that the designated sampling location(s) where a sample is to be collected is representative of a major public access area where the public will have full access to the water.
- 2) Mark the cubitainer (clear, plastic, 1-liter cube shaped bottle, non-preserved) with the following information:
 - a. Sample Station I.D. number
 - b. Sample Collection Time
 - c. Sample Collection Date
 - d. Sample Collector’s Name or Initials
- 3) Inflate the cubitainer. This can be done by removing the cap and gently exhaling into the opening until it completely inflates. (Do not contaminate the cube by expelling saliva into the container.)
- 4) Submerge the pole sampler’s beaker open end down through the water until completely submerged. Slowly turn the sample pole until the beaker is sideways and approximately 1-2” under the water’s surface. Once the beaker is filled, pull the sample pole and attached beaker out of the water.
- 5) Pour collected sample into the inflated cubitainer. It generally takes two of these processes to fill one cubitainer.
- 6) Leave a headspace in the container of at least ½” for gas expansion.
- 7) Secure the lid and wipe the cubitainer until it is clean and dry. Place in a plastic zip lock bag and then in a cooler.
- 8) Move to your next sampling location.
- 9) If sample collection is required in the future at that same public access area, then collect as close as possible to that exact point. (Do not “chase the scum” that might appear a few feet away from your original sampling point.) This will maintain consistency of the sampling activities.

b. “Composite” Samples:

- 1) Verify that the designated sampling location(s) where a sample is to be collected is representative of a major public access area where the public will have full access to the water.
- 2) Mark the cubitainer (clear, plastic, 1-liter cube shaped bottle, non-preserved) with the following information:

- a. Sample Station I.D. number
 - b. Sample Collection Time
 - c. Sample Collection Date
 - d. Sample Collector's name or initials
- 3) Inflate the cubitainer. Inflating the cubitainer can be done by removing the cap, gently exhaling into the opening until it completely inflates. (Do not contaminate the cube by expelling saliva into the container.)
 - 4) Submerge the pole sampler's beaker open end down through the water until completely covered. Slowly turn the sample pole until the beaker is sideways and approximately 1 -2" under the water's surface. Once the beaker is filled pull the sample pole and attached beaker out of the water.
 - 5) Pour collected sample into a clean bucket. Continue this process collecting samples from various locations around the dock, (e.g., one from each side of the dock).
 - 6) Once all samples have been collected and poured into the bucket, swirl the bucket to mix.
 - 7) Pour the mixed sample into the inflated cubitainer.
 - 8) Leave a headspace in the container of at least ½" for gas expansion.
 - 9) If sample collection is required in the future at that same public access area, then collect as close as possible to that exact initial point. (Do not "chase the scum" that might appear a few feet away from your original sampling point.) This will maintain consistency of the sampling activities.

B. How to Collect Water Samples for Drinking Water Analysis – (one glass non-preserved TOC bottle):

1. Using a pole sampler with an attached beaker or bucket with rope and swivel, a BA sample can be collected.
2. Verify that the designated sampling location(s) is representative of where a public water supply system would be pulling their raw water samples.
3. Mark the sample bottle (amber, glass, TOC bottle, non-preserved) with the following information:
 - a. Sample location I.D. number
 - b. Sample Collection Time
 - c. Sample Collection Date
 - d. Sample Collector's Name or Initials
4. Remove the cap.

5. Submerge the pole sampler's beaker open end down through the water until completely covered. Slowly turn the sample pole until the beaker is sideways and approximately 1-2" under the water's surface. Once the beaker is filled pull the sample pole and attached beaker out of the water. Do the same process for a bucket and rope.
6. Pour collected sample into the glass bottle.
7. Leave a headspace in the container of no less than ½" for gas expansion.
8. Secure the lid and wipe the bottle until it is clean and dry. Place in a cooler.
9. Move to your next sampling location.
10. If sample collection is required in the future at that same public access area, then collect as close as possible to that exact initial point. (Don't go chasing scum that might appear a few feet away from your original sampling point.) This will maintain consistency of the sampling activities.

C. How To Collect Nutrient Samples - (one Cubitainer and one Nutrient bottle per site):

1. Using a clean pole sampler with an attached beaker, collect a "grab" sample.
 - a. Nutrient samples will be collected only from designated locations believed representative of the lake's normal ambient sampling station. Verify that the location where the sample is to be collected is at the normal ambient sampling station or as close as possible to that station location.
2. Mark both the nutrient container, (brown, opaque, plastic 250 milliliter bottle, Sulfuric Acid preserved) and a cubitainer with the following information:
 - a. Sample location I.D. number
 - b. Sample Collection Time
 - c. Sample Collection Date
 - d. Sample Collector's name or initials
3. Submerge the beaker's open end down through the water until completely covered. Slowly turn the sample pole until the beaker is sideways and approximately 1-2" under the water's surface. Once the beaker is filled pull the sample pole and attached beaker out of the water.
4. Carefully open the Nutrient bottle. (The bottle contains a Sulfuric Acid preservative and will burn the skin or clothing.)
5. Slowly pour collected sample into the bottle making sure not to overfill as a loss of preservative will affect the integrity of the sample.
6. Secure the lid tightly and wipe clean and dry. Place the sample container in a zip lock bag and secure bag. (Placing the container in its own individual bag will minimize the potential of cross contamination).

7. Follow the “How to Collect Phytoplankton Samples” directions to fill the cubitainer for nutrients.
8. Place containers in a cooler.

*****REMINDER: All samples collected should be taken 1 to 2 inches under the water surface. Samples do not need to be taken at deeper depths when sampling for blue-green algae. Do not collect the sample at the surface (the air/water interface).**

D. Cleaning Equipment Between Samples:

1. “Between Sampling Locations at the Same Waterbody”
 - a. After the sample has been collected, discard any remaining water from sampling equipment.
 - b. Wipe all equipment dry with paper towel
 - c. Once at the next sampling location, rinse sampling equipment with ambient water at a different, but nearby, location that is different from but near the location where the sample is to be collected.
 - d. Discard rinse water, then move to sampling location to collect sample.
2. “Between Different Water Bodies”
 - a. Clean all sampling equipment with tap water.
 - b. Once at sampling location, rinse sampling equipment several times with ambient water at a location that is different from but near the location where the sample is to be collected.
 - c. Discard rinse water, then move to sampling location to collect sample.
 - d. Follow the above directions if additional samples are to be collected at the same waterbody.

E. Preparing Samples for Shipment:

1. Wipe dry the exterior of all cubitainers.
2. Place all containers in a cooler along with a cold pack(s). If ice is used, double bag it first before placing in the cooler. This will minimize the potential of cross-contamination or making a mess when the ice melts. Plastic pop bottles filled with water and then frozen can also be used in place of cold packs. Place enough cold packs or ice in the cooler to keep the samples cool. **DO NOT FREEZE THE SAMPLES.**
3. Fill out the algae and/or the KHEL PWS submission/chain-of-custody form (see **Appendix E**). When filling out the algae sampling form, include environmental conditions at time of sampling, e.g., water and air temperature, wind speed/direction, cloud cover, any unusual conditions.

4. If the samples are to be delivered by a carrier company, then place the submission form(s) inside a plastic bag and tape to the inside the lid of the cooler.
5. If samples are to be transported to the lab(s) by the collector or handed off to another partner, then place the submission form(s) inside a plastic bag and tape to the OUTSIDE the cooler so it is readily accessible for additional chain of custody signatures.
6. Secure the cooler.

D. Shipment of Samples:

1. Samples must be shipped no later than overnight.
2. At any time that the samples exchange to a different handler, then the chain-of-custody must be signed. Exception is if shipment is sent by commercial carrier, then note which company the samples were “relinquished to ...”
3. All algae samples are to be delivered or sent to:

Kansas Dept of Health and Environment
BOW-WPMAS HAB Program
1000 SW Jackson
Suite 420
Topeka, Kansas 66612-1367

4. All nutrient samples are to be sent to:

KHEL Laboratories
Forbes Field, Building 740
Topeka, Ks. 66620-0001

5. If necessary, Public Drinking Water samples will be taken to the Kansas Health and Environmental Lab by BOW/PWS staff, for those not analyzed by BOW-WPMAS.

If samples are shipped by carrier, to minimize shipping costs, send all samples to BOW/BEFS, including nutrient samples and we will carry the nutrient samples to the lab.

Further questions? Contact:

HAB response team:

Megan Maksimowicz – (785) 296-5580
Patricia Haines-Lieber – (785) 291-3267
Elizabeth Smith – (785) 296-4332

Taxonomy and toxin analysis:

Layne Knight – (785) 291-3885
Britini Bauer – (785) 296-5576
Tony Stahl – (785) 296-5578

Policy:

Trevor Flynn – (785) 296-8791

INITIAL PROCESSING OF ALGAL SAMPLES (HAB – 002)

I. INTRODUCTION

A. Purpose

The following paragraphs describe the procedure for the collection, preservation, and transport of algal samples from water bodies with a validated HAB complaint.

B. Minimum Staff Qualifications

Personnel implementing this SOP should meet requirements for State of Kansas Environmental Associate job class and be experienced in the measurement of the physicochemical and microbiological properties of surface water and the performance of environmental field investigations.

C. Equipment/Accessories

1. Lugol's solution
2. Sample bottles with lids
3. Yellow round labels
4. Chain of Custody sheet

II. PROCEDURES

A. Receiving samples

1. Coolers containing samples will be directed to BOW-WPMAS HAB Response Team or Analytical Support staff. This is usually around 10:00 to 10:30 a.m. on Tuesday or Wednesday, depending upon the carrier bringing in the samples.
2. Upon receiving the coolers, remove the samples and paperwork.
3. Place samples in refrigerator in the Algal ID lab until ready to process. Make sure the refrigerator door closes completely.
4. On the back of the Algae Sample Submission Form (see **Appendix E**) and under the Chain of Custody section, date and sign by the Received By line.
5. The Algae Sample Submission Forms are to be kept with the samples and are placed by the algal taxonomist's scope. Once sample analysis is completed, then the Sample Submission Form is to be filed by year with the lake reports.

B. Algal Preservation

1. When ready to process samples, remove them from the refrigerator and place on the black shelving unit in middle of Algal ID lab room in the order in which they will be processed.

2. In the drawer directly to the left of the sink, remove the yellow, round stickers and a pencil to mark each bottle used to preserve samples.
3. In the chlorophyll lab room (small room) and directly to the left of the door on a cart, remove one bottle for each sample to be preserved. Lids to the bottles are in the far-right bottom cabinet and on the bottom shelf.
4. Line the bottles and lids up on the counter by the refrigerator in the Algal ID lab. Write on the yellow stickers the lake number and sampling point (for example – Milford would be 190 as the lake number and AA is one of the sample points). Place the stickers on top of the lids prior to preserving sample.
5. In the same room and under the sink is the brown Lugol's container. It has a small needleless syringe attached to it. Place 5 drops of Lugol's in each bottle. Be careful with this as Lugol's does stain just about everything it comes in contact with, including the counter, hands, and clothes. Place bottle back under the sink.
6. Take the first sample and shake cubitainer vigorously to thoroughly mix the water and contents. Over the sink, carefully pour sample water into one of the small bottles containing the Lugol's until it is about to the line where the neck begins (about $\frac{1}{4}$ inch from the top). Double check that the lid you put on the bottle matches the sample you poured into it. Screw that lid onto the bottle securely.
7. A portion of the sample will need to be frozen to conduct the Elisa toxicity test so pour a good portion of the sample down the drain but retain at least a $\frac{1}{2}$ inch in the bottom of the cubitainer.
8. Continue this process with all the remaining samples.
9. Place the preserved samples on the table with the algal taxonomist's microscope.
10. Place the cubitainers with the saved water into the freezer in the main lab (middle) room. Make sure the lid to the freezer is closed tightly.

MICROCYSTIN TEST USING ELISA QUALITUBE KIT ET-022 (HAB – 003)

I. INTRODUCTION

A. Purpose

The following paragraphs describe the procedures for the collection, preservation, and transport of algal samples from water bodies with a validated HAB complaint.

B. Minimum Staff Qualifications

Personnel implementing this SOP should be experienced in the measurement of the physicochemical and microbiological properties of surface water and in the performance of environmental field investigations.

C. Equipment/Accessories

1. Envirologix qualitube kit for Microcystin.
2. Wooden block or test tube rack to place tubes in for analysis.
3. Timer.
4. Use of water in sink area.
5. Thawed water samples from freezer of lakes that are under investigation.
6. Paper and Pencil.
7. HACH Pocket Colorimeter™ II Analysis Systems 450 nm, 59530-45; with a 1 cm tube cell adapter
8. Kimwipes
9. Adjustable pipette (0.1 – 1.0 mL) and disposable tip

II. PROCEDURES

A. Preliminary procedures:

1. Remove frozen samples from freezer to begin thawing.
2. Read all the instructions before running the kit.
3. Allow all reagents to reach room temperature before beginning (at least 30 minutes with un-boxed tubes and reagents at room temperature – do not remove tubes from bag with desiccant until they have warmed up).
4. Organize all samples and reagents so that steps 1 and 2 can be performed in 3 minutes or less.
5. Do not run more than 6 tubes at a time.

B. Dilutions

1. To complete the assay in a timely manner, it may be helpful to dilute samples that are potentially high in toxin before testing them (*i.e.* based on previous week's analysis results, or based on visual appearance of sample). A dilution of 1:5 is often a good starting place; samples that do not fall within the absorbance range of the calibrators will need to be diluted at a different level.
2. A list of common dilutions is printed in the ELISA book, and include:

Ratio	Sample (mL)	DI Water (mL)	Dilution multiplier
1:1	0.5	0.5	x 2
1:2	0.5	1	x 3
1:3	0.5	1.5	x 4
1:4	0.5	2	x 5
1:5	0.5	2.5	x 6
1:6	0.5	3	x 7
1:7	0.5	3.5	x 8

3. Multiply the resultant concentration by the dilution multiplier to find the actual concentration of the sample.

C. Completing the assay.

1. Place tubes in wooden tube rack. The Calibrator tubes are the two tubes behind the six in front. These will be the tubes used to compare color intensity between 0.5 ppb and 3.0 ppb results. See Photo below.



2. Rapidly add **5 drops** of Microcystin Assay **diluent** to each tube in the assay.
3. Using the sample pipette provided, immediately add **2 drops of 0.5 ppb Microcystin calibrator** to the first tube. Add 2 drops of 3.0 ppb **Microcystin calibrator** into the second tube. Add 2 drops of sample to each of the subsequent

tubes up to a total of 4 samples. **Do Not Add Microcystin-enzyme conjugate in this step.**

4. Thoroughly mix the contents of the tubes by moving the tube holder in a rapid circular motion on flat surface for a full 20 - 30 seconds.
5. Incubate tubes at ambient temperature for 5 minutes.
6. Add **5 drops of Microcystin-enzyme conjugate** to each tube. Do not empty the tub contents or wash the tubes at this time. Thoroughly mix the contents of the tubes as in step 3.
7. Incubate tubes at ambient temperature for 20 minutes.
8. After incubation, vigorously shake the contents of the tubes into a sink or other suitable container. Flood the tubes completely with cool tap water, and then shake to empty. Repeat this wash step 3 times. Invert the tubes on a paper towel and tap to remove as much water at possible.
9. Add **10 drops of Substrate** to each tube. Thoroughly mix the contents of the tubes, as in Step 3. Incubate substrate in tubes for 10 minutes at ambient temperature.

NOTE: If blue color does not develop in the 0.5 ppb Calibrator tube, the assay is invalid and should be repeated.

10. This assay is designed to be read visually with un-stopped tubes (blue solution). If tubes are to be read using the tube colorimeter, pipette 0.7 mL of Stop Solution into each tube and mix thoroughly. This will turn the tube contents yellow.
 - a. Tubes should be read **within 30 minutes** of the addition of Stop Solution.
 - b. Proceed to step E to interpret the results using a colorimeter.
11. Interpret the results of un-stopped tubes immediately following the 10-minute substrate incubation.

D. Interpreting the results visually.

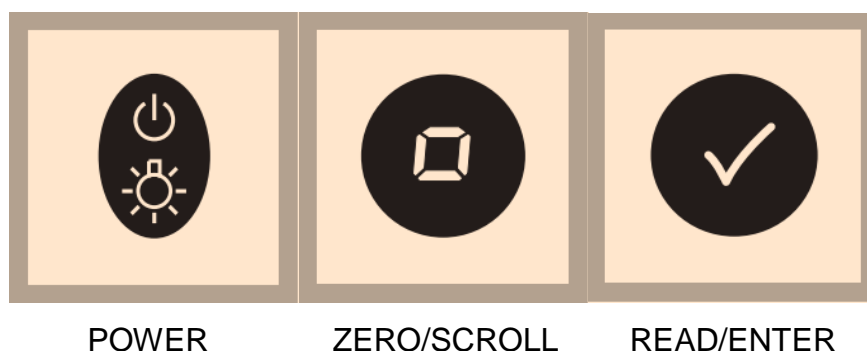
1. Compare the intensity of the blue color of each sample tube to the intensity of the blue color in the 0.5 and 3.0 ppb calibrator tubes.
2. Score each sample tube as having less than, more than or equal color to the two calibrator tubes.

3. Use the Table below to determine the level of microcystin in the samples.

Samples with Optical Density (OD) values.....	Contain.....
Greater than OD of 0.5 ppb Calibrator	Less than 0.5 ppb Microcystin
Between OD of 0.5 ppb and 3.0 ppb Calibrator	Between 0.5 and 3.0 ppb Microcystin
Less than OD of 3.0 ppb Calibrator	More than 3 ppb Microcystin

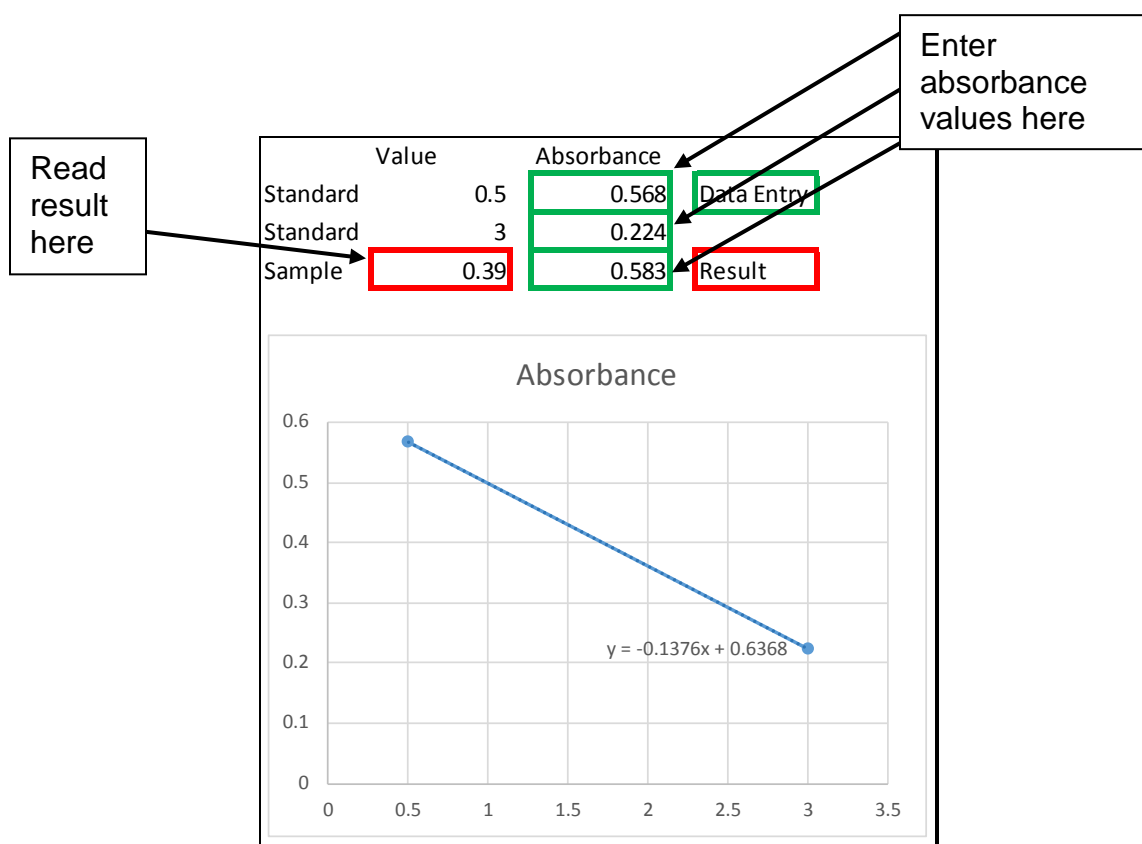
NOTE: For all diluted samples, the test results must be multiplied by the appropriate dilution factor to yield the final concentration of the original sample.

E. Interpreting the results using a colorimeter.



1. Fill a sample cell to the 10 mL line with DI water.
2. Press the POWER button to turn the meter on.
3. Remove the meter cap. Wipe excess liquid and finger prints off sample cells using a Kimwipe. Place the blank in the cell holder with the diamond mark facing the keypad. Fit the meter cap over the cell compartment to cover the cell.
4. Press ZERO/SCROLL button. The display will show “- - -”, then “0.000”.
5. Check the blank by pressing the READ/ENTER button. The instrument will show “- - -” followed by the results.
6. Remove the meter cap. Wipe excess liquid and finger prints off sample cells using a Kimwipe. Place the 0.5 calibrator in the cell holder with the diamond mark facing the keypad. Fit the meter cap over the cell compartment to cover the cell.

7. Press the READ/ENTER button. The instrument will show “- - -” followed by the results. Record the absorbance values in the Laboratory ELISA Assay Work Sheet.
8. Repeat steps 6-7 for the 3.0 calibrator and all the samples. Record the absorbance values in the Laboratory ELISA Assay Work Sheet.
9. To find the results, enter the absorbance values of the calibration cells, and the sample cell into the Envirologix Interpolation excel spreadsheet.



NOTE: For all diluted samples, the test results must be multiplied by the appropriate dilution factor to yield the final concentration of the original sample.

EnviroLogix® ELISA QualiTube assays were used according to manufacturer's specifications to measure total microcystin (detection limit 0.5 µg/L), viewable online at:

<http://www.envirologix.com/wp-content/uploads/2015/05/ET022-Microcystin-101215.pdf>.

EnviroLogix, Portland, Maine.

APPENDIX K

Lake Visitation Potential

LAKE VISITATION POTENTIAL MULTIPLICAND EXPLANATION

In determining a lake's visitation potential, the following equation was used:

$$\text{Population 30} \times \text{Lake Size Factor} \times \text{Lake Density Factor} \times \text{Public Access Factor} \times \text{Contact Recreation Factor} = \text{Lake Visitation Potential}$$

The following table is an explanation of the multiplicands in the above equation:

Population 30	Population within 30-mile radius		
Lake Size Factor	Based on lake size in acres, divided into classes and then assigned size factors:		
	Size Class	Size Factor	
	<1 acre =	.001	
	1 – 5 acres =	.01	
	5 – 50 acres =	0.1	
	50 – 500 acres =	0.5	
	500 – 1000 acres =	1.0	
	> 1000 acres =	2.0	
Lake Density Factor	Based on number of lakes within 30 mile diameter and then assigned density factors:		
	Number of Lakes	Density Factor	
	1 to 3 lakes =	1.0	
	4 to 6 lakes =	0.8	
	7 to 16 lakes =	0.6	
	> 16 lakes =	0.4	
Public Access Factor			
	Private Lake	Open to Public	
	1.0	0.1	
Contact Recreation Factor			
	Definition	Primary Contact Attainability	Recreation Factor
	Swimming beach/boating/skiing facilities provided.	Attainable	CR A = 1.0
	Swimming/boating facilities not provided but water depth greater than 18 inches.	Attainable	CR B = 0.5
	Waterbody less than 18 inches in depth. Full immersion not likely.	Not Attainable	CR a = 0.1

HAB KANSAS LAKE RANKING FOR VISITATION POTENTIAL

Top 25% in visitation potential are in the shaded rows; Lower 75% are in the unshaded rows

Lake Name	Pop_30	Acres	Size Class	Size Factor	Lake_30	Lakes Factor	Private	CR	Contact Factor	PWS	Final Score
Atchison Co. SFL	89512	61.0	50-500	0.500	2	1.0	1.00	B	1.0		44756
Augusta City Lake	509828	175.7	50-500	0.500	2	1.0	1.00	A	1.0	X	254914
Augusta Santa Fe Lake	535020	259.6	50-500	0.500	2	1.0	1.00	A	1.0		267510
Banner Creek Lake	145753	487.1	50-500	0.500	4	0.8	1.00	A	1.0	X	58301
Big Hill Lake	84056	1094.3	>1000	2.000	2	1.0	1.00	A	1.0	X	168112
Bone Creek Lake	60750	502.6	500-1000	1.000	3	1.0	1.00	B	0.5	X	30375
Butler Co. SFL	99034	106.7	50-500	0.500	1	1.0	1.00	B	0.5		24759
Carey Park Lake	152484	77.6	50-500	0.500	2	1.0	1.00	A	1.0		76242
Cedar Bluff Lake	32321	4271.9	>1000	2.000	1	1.0	1.00	A	1.0		64642
Cedar Creek Lake	65034	308.5	50-500	0.500	3	1.0	1.00	A	1.0		32517
Cedar Lake	781930	62.2	50-500	0.500	11	0.6	1.00	B	0.5		117290
Chase Co. SFL	53635	104.1	50-500	0.500	1	1.0	1.00	A	1.0		26818
Cheney Lake	368923	9664.1	>1000	2.000	1	1.0	1.00	A	1.0	X	737846
Clinton Lake	381928	7389.9	>1000	2.000	4	0.8	1.00	A	1.0	X	611085
Council Grove City Lake	71922	387.7	50-500	0.500	2	1.0	1.00	A	1.0	X	35961
Council Grove Lake	77452	2730.7	>1000	2.000	2	1.0	1.00	A	1.0		154904
Douglas Co. SFL	602250	175.8	50-500	0.500	5	0.8	1.00	B	0.5		120450
Edgerton City Lake	717271	7.1	5-50	0.100	6	0.8	1.00	B	0.5		28691
El Dorado Lake	173182	7697.9	>1000	2.000	1	1.0	1.00	A	1.0	X	346364
Elk City Lake	63744	3414.6	>1000	2.000	2	1.0	1.00	A	1.0		127488
Emery Park Lake	546896	6.6	5-50	0.100	10	0.6	1.00	A	1.0		32814
Fall River Lake	25456	2190.9	>1000	2.000	2	1.0	1.00	A	1.0		50912
Fort Scott City Lake	62490	333.4	50-500	0.500	6	0.8	1.00	A	1.0		24996
Gardner City Lake	792878	105.5	50-500	0.500	10	0.6	1.00	A	1.0	X	237863
Geary Co. SFL	117663	95.6	50-500	0.500	2	1.0	1.00	B	0.5		29416
Hargis Lake	389436	60.2	50-500	0.500	3	1.0	1.00	B	0.5		97359
Harvey Co. East Lake	449243	180.8	50-500	0.500	3	1.0	1.00	A	1.0		224622
Harvey Co. West Park Lake	327562	12.4	5-50	0.100	1	1.0	1.00	A	1.0		32756
Herington City Lake	65571	168.7	50-500	0.500	3	1.0	1.00	A	1.0	X	32786
Herington Reservoir	61796	522.5	500-1000	1.000	3	1.0	1.00	A	1.0		61796
Heritage Park Lake	738651	38.9	5-50	0.100	11	0.6	1.00	A	1.0		44319
Hillsdale Lake	647463	4295.0	>1000	2.000	5	0.8	1.00	A	1.0	X	1035941
Inman Lake	137270	133.4	50-500	0.500	2	1.0	1.00	B	0.5		34318
John Redmond Lake	61949	8158.4	>1000	2.000	3	1.0	1.00	A	1.0		123898
Kanopolis Lake	91811	2933.5	>1000	2.000	1	1.0	1.00	A	1.0	X	183622

Lake Name	Pop_30	Acres	Size Class	Size Factor	Lake_30	Lakes Factor	Private	CR	Contact Factor	PWS	Final Score
Kirwin Lake	15952	1535.1	>1000	2.000	1	1.0	1.00	A	1.0		31904
La Cygne Lake	49815	2371.2	>1000	2.000	2	1.0	1.00	B	0.5		49815
Lake Afton	506353	249.9	50-500	0.500	2	1.0	1.00	A	1.0		253177
Lake Crawford State Park #2	65383	120.2	50-500	0.500	4	0.8	1.00	A	1.0		26153
Lake Shawnee	315903	378.2	50-500	0.500	12	0.6	1.00	A	1.0		94771
Leavenworth Co. SFL	811776	150.7	50-500	0.500	2	1.0	1.00	B	0.5		202944
Lebo City Lake	65139	63.2	50-500	0.500	3	1.0	1.00	A	1.0		32570
Lone Star Lake	368604	175.6	50-500	0.500	4	0.8	1.00	A	1.0		147442
Louisburg Old Lake	481872	22.0	5-50	0.100	3	1.0	1.00	A	1.0		48187
Louisburg SFL	262726	269.0	50-500	0.500	3	1.0	1.00	B	0.5		65682
Lovewell Lake	11987	2626.8	>1000	2.000	1	1.0	1.00	A	1.0		23974
Madison City Lake	54446	94.6	50-500	0.500	1	1.0	1.00	A	1.0	X	27223
Marion Co. Lake	54200	123.4	50-500	0.500	2	1.0	1.00	A	1.0		27100
Marion Lake	63460	6195.8	>1000	2.000	3	1.0	1.00	A	1.0	X	126920
Melvorn Lake	85020	6221.7	>1000	2.000	5	0.8	1.00	A	1.0	X	136032
Miami Co. SFL	106927	110.1	50-500	0.500	3	1.0	1.00	B	0.5		26732
Milford Lake	121813	15182.0	>1000	2.000	1	1.0	1.00	A	1.0	X	243626
Miola Lake	445952	182.7	50-500	0.500	5	0.8	1.00	A	1.0		178381
Mission Lake	52543	136.5	50-500	0.500	3	1.0	1.00	A	1.0		26272
New Olathe Lake	798253	141.8	50-500	0.500	12	0.6	1.00	A	1.0		239476
Olpe City Lake	51343	75.3	50-500	0.500	1	1.0	1.00	A	1.0		25672
Osage City Reservoir	159618	50.3	50-500	0.500	3	1.0	1.00	B	0.5	X	39905
Osage Co. SFL	312092	131.1	50-500	0.500	6	0.8	1.00	B	0.5		62418
Oskaloosa Lake	411385	12.5	5-50	0.100	4	0.8	1.00	A	1.0		32911
Parsons Lake	84602	803.1	500-1000	1.000	4	0.8	1.00	A	1.0		67682
Perry Lake	357757	10587.6	>1000	2.000	3	1.0	1.00	A	1.0		715514
Pomona Lake	292313	3720.9	>1000	2.000	5	0.8	1.00	A	1.0	X	467701
Pottawatomie Co. SFL #2	115674	70.2	50-500	0.500	3	1.0	1.00	B	0.5		28919
Prairie Lake	96519	61.3	50-500	0.500	4	0.8	1.00	A	1.0		38608
Shawnee Co. SFL	222703	121.5	50-500	0.500	1	1.0	1.00	B	0.5		55676
Shawnee Mission Lake	797476	115.5	50-500	0.500	13	0.6	1.00	A	1.0		239243
Strowbridge Reservoir	313569	241.1	50-500	0.500	5	0.8	1.00	B	0.5	X	62714
Toronto Lake	39413	2476.0	>1000	2.000	3	1.0	1.00	A	1.0		78826
Tuttle Creek Lake	120588	11987.0	>1000	2.000	2	1.0	1.00	A	1.0		241176
Wabaunsee Co. Lake	143131	207.2	50-500	0.500	2	1.0	1.00	A	1.0	X	71566

Lake Name	Pop_30	Acres	Size Class	Size Factor	Lake_30	Lakes Factor	Private	CR	Contact Factor	PWS	Final Score
Waconda Lake	18075	10050.0	>1000	2.000	1	1.0	1.00	A	1.0	X	36150
Webster Lake	13063	1337.9	>1000	2.000	2	1.0	1.00	A	1.0		26126
Wellington Lake	149226	384.8	50-500	0.500	3	1.0	1.00	A	1.0	X	74613
Wellington New City Lake	120188	206.3	50-500	0.500	3	1.0	1.00	A	1.0	X	60094
Wilson Lake	19430	7760.8	>1000	2.000	1	1.0	1.00	A	1.0		38860
Winfield City Lake	162563	1041.3	>1000	2.000	2	1.0	1.00	A	1.0		325126
Wolf Creek Lake	63817	4983.9	>1000	2.000	3	1.0	1.00	B	0.5		63817
Wyandotte Co. Lake	744936	323.0	50-500	0.500	6	0.8	1.00	A	1.0		297974
Yates Center Reservoir	49547	112.8	50-500	0.500	3	1.0	1.00	A	1.0	X	24774
Alma City Lake	152934	24.5	5-50	0.100	2	1.0	1.00	B	0.5	X	7647
Altamont City Main Lake (#1)	73347	21.3	5-50	0.100	4	0.8	1.00	B	0.5		2934
Altamont City West Lake (#3)	73347	11.0	5-50	0.100	4	0.8	1.00	B	0.5		2934
Antelope Lake	10724	1.6	1-5	0.010	2	1.0	1.00	B	0.5		54
Anthony City Lake	16874	113.2	50-500	0.500	1	1.0	1.00	A	1.0		8437
Antioch Park Lake	712904	2.4	1-5	0.010	8	0.6	1.00	A	1.0		4277
Atchison Co. Park Lake	58120	70.7	50-500	0.500	3	1.0	1.00	B	0.5		14530
Atchison Co. SFL	89512	61.0	50-500	0.500	2	1.0	1.00	B	0.5		22378
Atwood Township Lake	9400	39.6	5-50	0.100	1	1.0	1.00	B	0.5		470
Barber Co. SFL	19820	44.1	5-50	0.100	1	1.0	1.00	B	0.5		991
Bartlett City Lake	71317	15.9	5-50	0.100	5	0.8	1.00	B	0.5		2853
Barton Lake	44053	13.6	5-50	0.100	3	1.0	1.00	a	0.1		441
Belleville City Lake	17370	18.3	5-50	0.100	1	1.0	1.00	B	0.5		869
Beymer Lake	53364	4.9	1-5	0.010	1	1.0	1.00	A	1.0		534
Big Creek Oxbow	40730	3.0	1-5	0.010	1	1.0	1.00	B	0.5		204
Big Eleven Lake	680789	3.4	1-5	0.010	5	0.8	1.00	B	0.5		2723
Blue Mound City Lake	55737	21.3	5-50	0.100	3	1.0	1.00	B	0.5		2787
Bourbon Co. SFL	61420	92.0	50-500	0.500	2	1.0	1.00	B	0.5		15355
Boy Scout Lake	37943	4.2	1-5	0.010	3	1.0	1.00	A	1.0		379
Bronson City Lake	60865	13.7	5-50	0.100	3	1.0	1.00	B	0.5		3043
Brown Co. SFL	41704	69.1	50-500	0.500	2	1.0	1.00	B	0.5		10426
Buffalo Park Lake	544397	11.9	5-50	0.100	8	0.6	1.00	B	0.5		16332
Caney City Lake	48681	64.7	50-500	0.500	1	1.0	1.00	B	0.5		12170
Carbondale West Lake	311608	7.1	5-50	0.100	6	0.8	1.00	B	0.5		12464

Lake Name	Pop_30	Acres	Size Class	Size Factor	Lake_30	Lakes Factor	Private	CR	Contact Factor	PWS	Final Score
Cedar Creek Reservoir	52918	198.5	50-500	0.500	6	0.8	1.00	B	0.5		10584
Cedar Crest Lake	297115	2.6	1-5	0.010	11	0.6	1.00	B	0.5		891
Central Park Lake	306380	1.3	1-5	0.010	12	0.6	1.00	B	0.5		919
Centralia Lake	34278	232.9	50-500	0.500	1	1.0	1.00	A	1.0		17139
Chanute Santa Fe Lake	66349	73.4	50-500	0.500	1	1.0	1.00	B	0.5		16587
Chisholm Creek Park Lake	553034	2.7	1-5	0.010	9	0.6	1.00	B	0.5		1659
Cimarron Lake (Moss Lake Middle)	9837	1.1	1-5	0.010	3	1.0	1.00	B	0.5		49
Circle Lake	47404	21.7	5-50	0.100	3	1.0	1.00	B	0.5		2370
Clark Co. SFL	35045	292.5	50-500	0.500	1	1.0	1.00	B	0.5		8761
Colby City Lake	13208	1.6	1-5	0.010	1	1.0	1.00	B	0.5		66
Concannon SFL	46289	13.4	5-50	0.100	1	1.0	1.00	B	0.5		2314
Cowley Co. SFL	41133	77.1	50-500	0.500	1	1.0	1.00	B	0.5		10283
Crystal Lake	70301	13.8	5-50	0.100	4	0.8	1.00	B	0.5		2812
Dillon Park Lakes	133976	2.9	1-5	0.010	2	1.0	1.00	B	0.5		670
Dornwood Park Lake	314838	0.0	<1	0.001	12	0.6	1.00	B	0.5		94
Eagle Lake (BelAire Lake)	552268	4.6	1-5	0.010	9	0.6	1.00	B	0.5		1657
Edna City Lake	61240	11.8	5-50	0.100	4	0.8	1.00	A	1.0		4899
Elkhorn Lake	120243	4.4	1-5	0.010	4	0.8	1.00	B	0.5		481
Ellis City Lake	35480	8.6	5-50	0.100	1	1.0	1.00	B	0.5		1774
Elm Creek Lake	66006	78.5	50-500	0.500	8	0.6	1.00	A	1.0		19802
Empire Lake	55092	416.4	50-500	0.500	1	1.0	1.00	B	0.5		13773
Eureka Lake	21111	251.3	50-500	0.500	2	1.0	1.00	A	1.0	X	10556
Finney Co. SFL/W.A.	20521	5.0	5-50	0.100	1	1.0	1.00	B	0.5		1026
Ford Co. Lake	40554	15.2	5-50	0.100	3	1.0	1.00	B	0.5		2028
Fossil Lake	39866	42.2	5-50	0.100	1	1.0	1.00	B	0.5		1993
Francis Wachs W.A.	9717	7.7	5-50	0.100	1	1.0	1.00	a	0.1		97
Frisco Lake	846692	3.4	1-5	0.010	16	0.6	1.00	B	0.5		2540
Gage Park Lake	301669	2.8	1-5	0.010	11	0.6	1.00	B	0.5		905
Garnett North Lake	74584	44.1	5-50	0.100	4	0.8	1.00	A	1.0	X	5967
Goodman SFL	7777	23.5	5-50	0.100	1	1.0	1.00	B	0.5		389
Gridley City Lake	59484	33.7	5-50	0.100	1	1.0	1.00	A	1.0		5948
Gunn Park East Lake	52215	2.6	1-5	0.010	6	0.8	1.00	B	0.5		209
Gunn Park West Lake	52215	6.3	5-50	0.100	6	0.8	1.00	B	0.5		2089
Hain SFL	39804	27.5	5-50	0.100	2	1.0	1.00	B	0.5		1990
Hamilton Co. SFL	7000	43.8	5-50	0.100	1	1.0	1.00	B	0.5		350
Harrison Park Lake	525905	2.2	1-5	0.010	8	0.6	1.00	B	0.5		1578

Lake Name	Pop_30	Acres	Size Class	Size Factor	Lake_30	Lakes Factor	Private	CR	Contact Factor	PWS	Final Score
Harvey Co. Camp Hawk Lake	516016	3.6	1-5	0.010	3	1.0	1.00	A	1.0		5160
Harveyville Lake	225876	17.1	5-50	0.100	1	1.0	0.01	A	1.0		226
Herington City Park Lake	61958	2.0	1-5	0.010	3	1.0	1.00	B	0.5		310
Hiawatha City Lake	45520	7.1	5-50	0.100	2	1.0	1.00	B	0.5		2276
Hillsboro City Lake	73989	0.6	<1	0.001	2	1.0	1.00	B	0.5		37
Hodgeman Co. SFL/W.A.	37843	251.2	50-500	0.500	3	1.0	1.00		0.0		0
Hole In The Rock	416361	0.1	<1	0.001	4	0.8	1.00	B	0.5		167
Horseshoe Lake	545822	11.0	5-50	0.100	11	0.6	1.00	B	0.5		16375
Horsethief Canyon Lake	37943	450.0	50-500	0.500	1	1.0	1.00	A	1.0		18972
Jerry's Lake	625499	1.0	1-5	0.010	4	0.8	1.00	B	0.5		2502
Jetmore Lake	37582	30.9	5-50	0.100	3	1.0	1.00	A	1.0		3758
Jewell Co. SFL	18382	39.2	5-50	0.100	1	1.0	1.00	B	0.5		919
Jones Park Lake	54297	1.2	1-5	0.010	2	1.0	1.00	B	0.5		271
Kid's Lake	545822	9.6	5-50	0.100	11	0.6	1.00	B	0.5		16375
Kingman Co. SFL	32787	125.0	50-500	0.500	1	1.0	1.00	B	0.5		8197
Kiowa Co. SFL	13954	20.1	5-50	0.100	1	1.0	1.00	B	0.5		698
KWP Hatchery and Ponds	23156	80.5	50-500	0.500	3	1.0	1.00	B	0.5		5789
La Claire Lake	62827	6.4	5-50	0.100	2	1.0	1.00	B	0.5		3141
Lake Charles	40878	1.4	1-5	0.010	2	1.0	1.00	B	0.5		204
Lake Coldwater	8547	231.1	50-500	0.500	1	1.0	1.00	A	1.0		4274
Lake Dabanawa	575103	77.8	50-500	0.500	4	0.8	0.01	A	1.0		2300
Lake Idlewild	24899	6.1	5-50	0.100	1	1.0	1.00	B	0.5		1245
Lake Jayhawk	390956	19.7	5-50	0.100	4	0.8	0.01	A	1.0		313
Lake Jewell	18382	57.0	50-500	0.500	1	1.0	1.00	A	1.0		9191
Lake Jivaro	321526	73.2	50-500	0.500	6	0.8	0.01	A	1.0		1286
Lake Kahola	50283	359.0	50-500	0.500	1	1.0	0.01	A	1.0		251
Lake Meade State Park	26648	66.2	50-500	0.500	1	1.0	1.00	A	1.0		13324
Lake Quivera	786119	159.5	50-500	0.500	10	0.6	0.01	A	1.0	X	2358
Lake Scott State Park	11895	108.6	50-500	0.500	1	1.0	1.00	A	1.0		5948
Lake Sherwood	286615	239.9	50-500	0.500	11	0.6	0.01	A	1.0		860
Lake Tanko (Cherryvale City Lake)	83475	15.4	5-50	0.100	2	1.0	1.00	B	0.5		4174
Lake Warnock (Atchison City Lake)	102602	33.0	5-50	0.100	2	1.0	1.00	A	1.0		10260

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Lakeview Estates Lake	293903	16.9	5-50	0.100	11	0.6	0.01	B	0.5		88
Lakewood Park Lake	80197	10.9	5-50	0.100	2	1.0	1.00	B	0.5		4010
Lansing City Lake	756118	2.9	1-5	0.010	5	0.8	1.00	B	0.5		3024
Lebo City Park Lake	64185	2.3	1-5	0.010	3	1.0	1.00	B	0.5		321
Lemon Park Lake	22434	1.9	1-5	0.010	3	1.0	1.00	B	0.5		112
Leonard's Lake	45999	7.4	5-50	0.100	3	1.0	1.00	B	0.5		2300
Little Lake	53889	9.3	5-50	0.100	3	1.0	1.00	B	0.5		2694
Logan City Lake	16653	8.0	5-50	0.100	1	1.0	1.00	B	0.5		833
Logan Co. SFL	5751	44.3	5-50	0.100	1	1.0	1.00	B	0.5		288
Lyndon City Lake	127546	56.2	50-500	0.500	4	0.8	0.01	B	0.5		255
Lyon Co. SFL	68250	128.5	50-500	0.500	1	1.0	1.00	B	0.5		17063
Mahaffie Farmstead Lake	784664	1.3	1-5	0.010	12	0.6	1.00	B	0.5		2354
Mallard Lake (Moss Lake East)	11365	0.5	<1	0.001	3	1.0	1.00	B	0.5		6
Mary's Lake	724098	4.2	1-5	0.010	4	0.8	1.00	B	0.5		2896
McPherson Co. SFL	110756	39.9	5-50	0.100	1	1.0	1.00	B	0.5		5538
Memorial Park Lake	43200	12.7	5-50	0.100	3	1.0	1.00	B	0.5		2160
Merrit Lake	463067	5.5	5-50	0.100	4	0.8	1.00	B	0.5		18523
Mined Land Lake 01	71174	3.1	1-5	0.010	10	0.6	1.00	B	0.5		214
Mined Land Lake 02	71384	1.6	1-5	0.010	10	0.6	1.00	a	0.1		43
Mined Land Lake 03	70818	0.5	<1	0.001	10	0.6	1.00	B	0.5		21
Mined Land Lake 04	70818	10.2	5-50	0.100	10	0.6	1.00	B	0.5		2125
Mined Land Lake 05	89393	6.3	5-50	0.100	12	0.6	1.00	B	0.5		2682
Mined Land Lake 06	89393	6.8	5-50	0.100	12	0.6	1.00	B	0.5		2682
Mined Land Lake 07	84357	12.5	5-50	0.100	17	0.4	1.00	B	0.5		1687
Mined Land Lake 08	82348	11.3	5-50	0.100	18	0.4	1.00	B	0.5		1647
Mined Land Lake 09	80138	8.4	5-50	0.100	24	0.4	1.00	B	0.5		1603
Mined Land Lake 10	82093	1.0	1-5	0.010	25	0.4	1.00	B	0.5		164
Mined Land Lake 11	83477	5.8	5-50	0.100	30	0.4	1.00	B	0.5		1670
Mined Land Lake 12	82093	16.0	5-50	0.100	28	0.4	1.00	B	0.5		1642
Mined Land Lake 13	82093	4.6	1-5	0.010	26	0.4	1.00	B	0.5		164
Mined Land Lake 14	82093	7.9	5-50	0.100	26	0.4	1.00	B	0.5		1642
Mined Land Lake 15	82093	13.6	5-50	0.100	24	0.4	1.00	B	0.5		1642
Mined Land Lake 17	86726	17.3	5-50	0.100	36	0.4	1.00	B	0.5		1735
Mined Land Lake 18	86333	13.7	5-50	0.100	36	0.4	1.00	B	0.5		1727
Mined Land Lake 19	85712	15.0	5-50	0.100	35	0.4	1.00	B	0.5		1714
Mined Land Lake 20	89283	16.9	5-50	0.100	32	0.4	1.00	B	0.5		1786
Mined Land Lake 21	88129	15.1	5-50	0.100	34	0.4	1.00	B	0.5		1763
Mined Land Lake 22	86889	22.2	5-50	0.100	31	0.4	1.00	B	0.5		1738

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Mined Land Lake 23	88129	31.6	5-50	0.100	34	0.4	1.00	B	0.5		1763
Mined Land Lake 24	88910	35.0	5-50	0.100	28	0.4	1.00	B	0.5		1778
Mined Land Lake 25	88296	9.9	5-50	0.100	26	0.4	1.00	B	0.5		1766
Mined Land Lake 26	84491	9.5	5-50	0.100	24	0.4	1.00	B	0.5		1690
Mined Land Lake 27	89166	32.7	5-50	0.100	28	0.4	1.00	B	0.5		1783
Mined Land Lake 28	88910	0.5	<1	0.001	28	0.4	1.00	a	0.1		4
Mined Land Lake 29	88910	12.2	5-50	0.100	29	0.4	1.00	B	0.5		1778
Mined Land Lake 30	90064	30.6	5-50	0.100	28	0.4	1.00	B	0.5		1801
Mined Land Lake 31	86889	61.5	50-500	0.500	31	0.4	1.00	B	0.5		8689
Mined Land Lake 32	86889	14.2	5-50	0.100	34	0.4	1.00	B	0.5		1738
Mined Land Lake 33	90064	42.9	5-50	0.100	28	0.4	1.00	B	0.5		1801
Mined Land Lake 34	90064	32.7	5-50	0.100	28	0.4	1.00	B	0.5		1801
Mined Land Lake 35	88910	27.9	5-50	0.100	29	0.4	1.00	B	0.5		1778
Mined Land Lake 36	90812	20.8	5-50	0.100	28	0.4	1.00	B	0.5		1816
Mined Land Lake 37	86333	3.9	1-5	0.010	36	0.4	1.00	B	0.5		173
Mined Land Lake 38	86333	6.1	5-50	0.100	36	0.4	1.00	B	0.5		1727
Mined Land Lake 39	89283	14.3	5-50	0.100	34	0.4	1.00	B	0.5		1786
Mined Land Lake 40	88129	16.9	5-50	0.100	34	0.4	1.00	B	0.5		1763
Mined Land Lake 41	87495	41.8	5-50	0.100	36	0.4	1.00	B	0.5		1750
Mined Land Lake 42	86333	11.9	5-50	0.100	36	0.4	1.00	B	0.5		1727
Mined Land Lake 43	86333	9.9	5-50	0.100	36	0.4	1.00	B	0.5		1727
Mined Land Lake 44	86333	77.2	50-500	0.500	36	0.4	1.00	B	0.5		8633
Mined Land Lake 45	86333	47.5	5-50	0.100	35	0.4	1.00	B	0.5		1727
Mingenback Lake	140443	3.2	1-5	0.010	2	1.0	1.00	B	0.5		702
Moline City #1 (Santa Fe Lake)	17924	12.9	5-50	0.100	4	0.8	1.00	A	1.0		1434
Moline City Lake #2	15945	25.0	5-50	0.100	3	1.0	1.00	B	0.5	X	797
Moline Reservoir	21124	160.9	50-500	0.500	4	0.8	1.00	A	1.0		8450
Montgomery Co. SFL	67401	85.4	50-500	0.500	3	1.0	1.00	B	0.5		16850
Moss Lake	545822	13.6	5-50	0.100	11	0.6	1.00	B	0.5		16375
Mound City Lake	49818	122.9	50-500	0.500	4	0.8	1.00	B	0.5		9964
Murray Gill Lake	32540	401.6	50-500	0.500	3	1.0	1.00	A	1.0		16270
Myer's Lake	319862	13.1	5-50	0.100	10	0.6	1.00	B	0.5		9596
Nebo SFL	160582	30.0	5-50	0.100	4	0.8	1.00	B	0.5		6423
Neosho Co. SFL	92321	56.6	50-500	0.500	2	1.0	1.00	B	0.5		23080
Neosho Falls City Lake	47404	1.7	1-5	0.010	3	1.0	1.00	B	0.5		237
New Strawn Park Lake	70143	3.0	1-5	0.010	3	1.0	1.00	B	0.5		351
New Yates Center Lake	49996	168.0	50-500	0.500	5	0.8	1.00	B	0.5		9999

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Newton City Park Lake	470621	34.2	5-50	0.100	3	1.0	1.00	B	0.5		23531
North Park Lake	795260	2.3	1-5	0.010	5	0.8	1.00	B	0.5		3181
Norton Lake (Sebelius Lake)	11357	782.4	500-1000	1.000	1	1.0	1.00	A	1.0	X	11357
Ogden City Lake	125126	13.7	5-50	0.100	2	1.0	1.00	A	1.0		12513
Olathe Waterworks Lakes	779776	9.8	5-50	0.100	12	0.6	1.00	B	0.5		23393
Osawatomie City Lake	242417	24.5	5-50	0.100	3	1.0	1.00	B	0.5		12121
Otis Creek Lake (Eureka)	31373	240.1	50-500	0.500	2	1.0	1.00	B	0.5		7843
Ottawa Co. SFL	74729	95.3	50-500	0.500	1	1.0	1.00	B	0.5		18682
Overbrook Lake	321788	6.0	5-50	0.100	7	0.6	1.00	B	0.5		9654
Paola City Lake	501558	23.9	5-50	0.100	4	0.8	1.00	B	0.5		20062
Parker City Lake	68429	7.5	5-50	0.100	1	1.0	1.00	B	0.5		3421
Peter Pan Lake	55838	2.8	1-5	0.010	2	1.0	1.00	B	0.5		279
Pierson Park Lake	722265	11.4	5-50	0.100	9	0.6	1.00	B	0.5		21668
Pittsburg College Lake	70254	2.1	1-5	0.010	12	0.6	1.00	B	0.5		211
Plainville Township Lake	34838	23.5	5-50	0.100	1	1.0	1.00	B	0.5		1742
Playter's Lake	74794	3.8	1-5	0.010	12	0.6	1.00	B	0.5		224
Pleasanton City Lake #1	47058	24.4	5-50	0.100	5	0.8	1.00	B	0.5	X	1882
Pleasanton City Lake #2	47058	15.3	5-50	0.100	5	0.8	1.00	B	0.5	X	1882
Pleasanton Reservoir	45226	100.1	50-500	0.500	4	0.8	1.00	A	1.0	X	18090
Point of Rocks Lake (Moss Lake West)	4369	1.0	1-5	0.010	3	1.0	1.00	B	0.5		22
Polk Daniels Lake (Elk Co. SFL)	24510	64.8	50-500	0.500	3	1.0	1.00	B	0.5		6128
Pony Creek Lake	25509	103.6	50-500	0.500	3	1.0	1.00	B	0.5		6377
Pottawatomie Co. SFL #1	93146	17.3	5-50	0.100	1	1.0	1.00	B	0.5		4657
Potter's Lake	667491	1.2	1-5	0.010	3	1.0	1.00	B	0.5		3337
Pratt Co. Lake	23156	46.4	5-50	0.100	3	1.0	1.00	B	0.5		1158
Prescott City Lake	27862	16.6	5-50	0.100	4	0.8	1.00	B	0.5		1114
Quarry Lake	45414	16.9	5-50	0.100	4	0.8	1.00	B	0.5		1817
Richmond City Lake	76745	12.7	5-50	0.100	3	1.0	1.00	B	0.5		3837
Riggs Park Lake	523717	1.2	1-5	0.010	3	1.0	1.00	B	0.5	X	2619
Rimrock Park Lake	124316	2.5	1-5	0.010	3	1.0	1.00	B	0.5		622

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Rock Creek Lake	57709	52.8	50-500	0.500	6	0.8	1.00	B	0.5		11542
Rocky Ford W.A.	120579	7.7	5-50	0.100	3	1.0	1.00	B	0.5		6029
Rooks Co. SFL	14433	28.4	5-50	0.100	2	1.0	1.00	B	0.5		722
Rose's Lake	788410	2.3	1-5	0.010	13	0.6	1.00	B	0.5		2365
Sabetha City Lake	26388	105.9	50-500	0.500	3	1.0	1.00	B	0.5	X	6597
Sabetha Watershed Lake (Niehues)	31775	0.3	<1	0.001	3	1.0	1.00	B	0.5		16
Saline Co. SFL	81073	21.9	5-50	0.100	2	1.0	1.00	B	0.5		4054
Scranton City Lake	306324	10.3	5-50	0.100	6	0.8	1.00	B	0.5		12253
Sedan City North Lake	29588	40.2	5-50	0.100	3	1.0	1.00	B	0.5		1479
Sedan City South Lake	29588	64.2	50-500	0.500	3	1.0	1.00	A	1.0		14794
Severy City Lake	21892	11.6	5-50	0.100	2	1.0	1.00	B	0.5	X	1095
Sheridan Co. SFL	8681	43.4	5-50	0.100	2	1.0	1.00	B	0.5		434
Smith Lake	463048	3.4	1-5	0.010	4	0.8	1.00	B	0.5		1852
Smoky Hill Garden Lake	8509	12.7	5-50	0.100	2	1.0	1.00	B	0.5		425
South Lake Park	705078	6.0	5-50	0.100	11	0.6	1.00	B	0.5		21152
Spring Creek Park Lake	519850	11.3	5-50	0.100	4	0.8	1.00	B	0.5		20794
Spring Hill City Lake	768642	33.3	5-50	0.100	10	0.6	1.00	B	0.5		23059
St. Jacobs Well (Big Basin W.A.)	8562	15.0	5-50	0.100	1	1.0	1.00	B	0.5		428
Sterling City Lake	85980	8.3	5-50	0.100	1	1.0	1.00	B	0.5		4299
Stohl Park Lake	763134	1.6	1-5	0.010	12	0.6	1.00	B	0.5		2289
Stone Lake	45526	37.4	5-50	0.100	3	1.0	1.00	B	0.5		2276
Sunflower Park Lake	829896	1.4	1-5	0.010	3	1.0	1.00	B	0.5		4149
Thayer New City Lake	71381	16.8	5-50	0.100	3	1.0	1.00	B	0.5		3569
Thayer Old City Lake	70838	23.5	5-50	0.100	3	1.0	1.00	A	1.0		7084
Timber Lake	68236	20.6	5-50	0.100	1	1.0	1.00	B	0.5		3412
Topeka Public Golf Course Lake	285001	3.3	1-5	0.010	10	0.6	1.00	B	0.5		855
Troy Fair Lake	37607	5.1	5-50	0.100	1	1.0	1.00	B	0.5		1880
Vic's Lake	545822	11.4	5-50	0.100	11	0.6	1.00	B	0.5		16375
Wamego City Lake	109648	0.8	<1	0.001	2	1.0	1.00	B	0.5		55
Warren Park Lake	304134	0.2	<1	0.001	12	0.6	1.00	B	0.5		91
Washburn Rural Environmental Lab Lake	300128	3.7	1-5	0.010	11	0.6	1.00	B	0.5		900
Washington Co. SFL	18735	77.8	50-500	0.500	1	1.0	1.00	B	0.5		4684

Lake Name	Pop_30	Acres	Size Class	Size Factor	Lake_30	Lakes Factor	Private	CR	Contact Factor	PWS	Final Score
Watson Park Lake	555774	21.1	5-50	0.100	11	0.6	1.00	B	0.5		16673
Wilson Co. SFL	50955	109.4	50-500	0.500	2	1.0	1.00	B	0.5		12739
Windmill Lake	547874	17.4	5-50	0.100	11	0.6	1.00	B	0.5		16436
Winfield Park Lagoon	123647	6.1	5-50	0.100	2	1.0	1.00	B	0.5		6182
Woodson Co. SFL	51694	112.5	50-500	0.500	5	0.8	1.00	B	0.5		10339
Xenia Lake	50005	65.5	50-500	0.500	3	1.0	1.00	B	0.5	X	12501

APPENDIX L

Standard Operating Procedures for HAB Data Management System

<u>Procedure</u>	<u>Last Revised</u>
The Survey Web Application (DM-001)	03/30/19
Oracle Harmful Algal Bloom Database System (DM-002)	03/30/19
KDHE Harmful Algae Bloom Management System (DM-003)	03/30/19

THE SURVEY WEB APPLICATION (DM-001)

The Survey Web Application is the public facing web interface to the KDHE's complaint tracking system, <http://www.kdheks.gov/algae-illness/index.htm>. It has three distinct entry forms:

1) Algal Bloom complaint

<https://www.dhe.state.ks.us/Community/se.ashx?s=11B9BDC9137C980B>

2) Human Health complaint

<https://www.dhe.state.ks.us/Community/se.ashx?s=11B9BDC955117283> and

3) Animal Health complaint

<https://www.dhe.state.ks.us/Community/se.ashx?s=11B9BDC95DA38790>

The algal complaint form is routed simultaneously to environmental staff in BOW and BEFS and queued into the HAB Tracking System. The human and animal health complaints are simultaneously routed to staff in BEPHI. Complaints are responded to by the respective staff.

1. Algal bloom complaints are received into the HAB Tracking System, where they will be reviewed by BOW-WPMAS staff to determine whether the complaint is valid and whether the waterbody is a "public" lake and/or a Public Drinking water supply source.
2. Human and Animal health complaints are reviewed by the BEPHI staff to determine if the illness is associated with HAB exposure. The BEPHI staff is required to enter the environmentally relevant portion of the complaint information (no Protected Health information) into the algal bloom component to initiate the investigation.

Technical Note: The Survey Web Applications are built within KDHE ArcGIS Online Organizational account. They were built by Office of Information Technology GIS Staff using Desktop ESRI Survey123 Connect Application. The data from the Survey is written into the KDHE Oracle GIS Schema, which is then consumed by the Harmful Algal Bloom Tracking System (Oracle APEX application). Verification of the Survey is the first step in the HAB Management System.

ORACLE HARMFUL ALGAL BLOOM DATABASE SYSTEM (DM-002)

- I. A critical component of the HAB Management System, which is required by the HAB Tracking System, are two other Oracle databases. The two other Oracle databases are updated through separate applications:
 - A. **The Surface Water Site ID System.** The locations of all sites sampled for any water quality parameter are entered into this database. This geospatial database gives the geographic location of the sites, names, and other fields explained below. A site not existing in the system needs to be entered prior to associating/entering any data. (Oracle Table: GIS.HYDRO_BOW_MON_POINT)
 - B. **The Algae Database.** This contains cell counts for several individual cyanobacteria taxa as well as for diatoms, dinoflagellates, cryptophytes, euglenophytes, and other algae. It also contains calculated metrics (percent cell counts) and percent biomass counts for these. In addition, it contains results from toxin analysis. Data must be hadn entered into this database before the HAB Tracking System can evaluate recommended advisory status for a given waterbody. (Oracle Table: BEFS_ADMIN.ALGAE)

Both databases are used by the monitoring networks outside of the HAB system. The procedures to enter both databases are as follows:

A. Surface Water Site ID System

In order to enter HAB data into KDHE's Oracle database, first a Surface Water Site has to be created in Oracle Forms for the HAB site. If a header already exists for the site then proceed to **B**.

1. Logon to Oracle has to be authorized by IT:

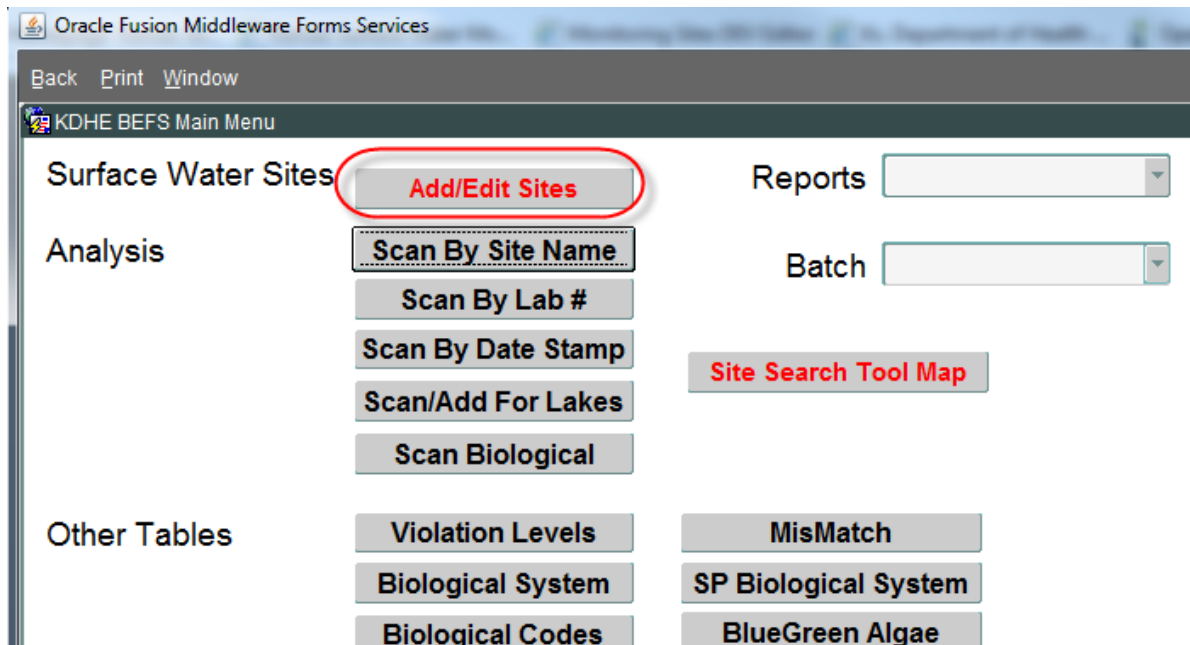
http://kdhenet/KDHEoracle_apps_gallery.htm



Surface Water Quality Analysis

[... \(oraforms\SC\SCMAINMENU.fmx\)](#)

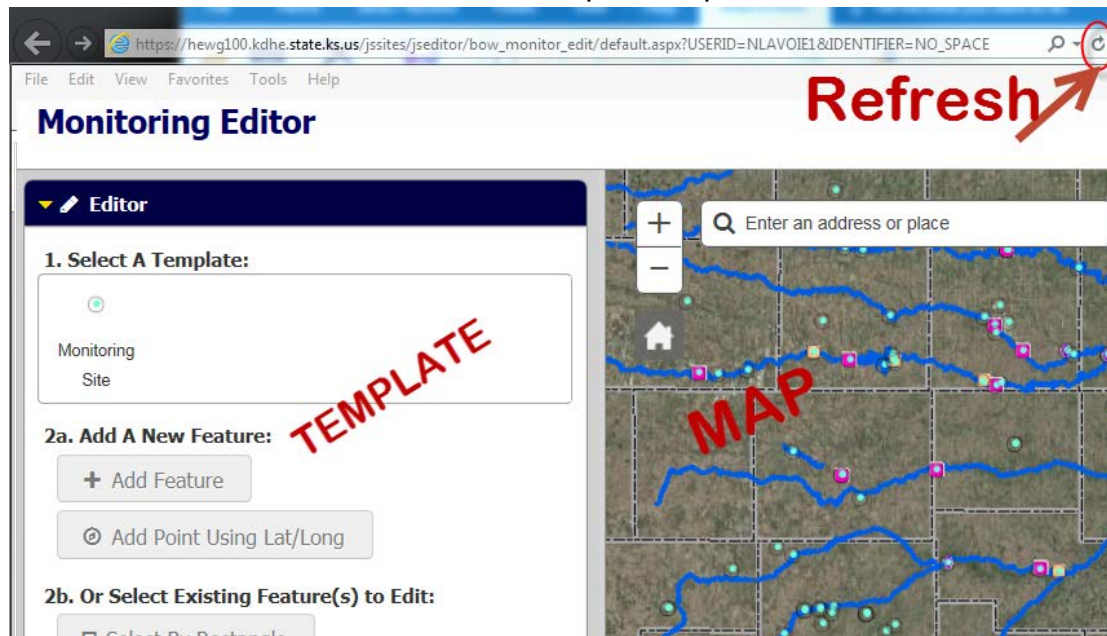
2. Log onto Oracle, and click on 'Add/Edit Sites' to add HAB site header:



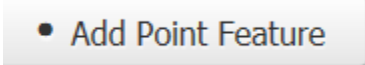
3. This will open a Web Map Editor in which to add the new Site Header.

****NOTE:** If you receive a 404 web page not found error, please request your name be added to the approved Web Map Editing. This is a separate security layer for editing in the map.

**** Click Refresh on the browser if the map or template doesn't draw first time.**



4. Add the Point Using one of the following methods:
1. Click on the “Select A Template” Monitoring Site to make it active
 2. A. - Zoom in on the map to location ...

- Click  ...

- Click on the map to add the point or

B. If you already have Lat/Long from GPS or other source ...






Click the  and enter the coordinate.

3. Enter required minimum information (the site name will be decided by HAB group) on screen:

- ** MUST HAVE HAB SAMPLE? “YES” for it to draw in the HAB web maps.
- ** Attachements can be added only after a NEW point is saved and the map Refreshed.
- ** HUC 12 and County Labels should be drawing in the map (or turn the layer on)

3. Edit Attributes ----- **4.**

Must Save Point before Adding Attachments:

 Zoom     (1 of 2)

Sample Site ID LM0190AH

Program Code LM

Program Name Harmful Algae Blooms

Water Source Name MILFORD LAKE

Water Source Type LAKE/POND

Site Use HAB only

SC Site Type/Status

LM Site Type/Status Federal Lake

Site Feature Type DOCK

On Water Register? No

For HAB Sample? Yes

County GEARY

HUC 12 102500170608

Alias Site Name

Location Descrip BOAT RAMP IN EAST ROLLIN

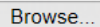
Comments




Collected By MBUTLER

Attachments:

LM0190AH Milford Boat Ramp 06272016.jpg(X)

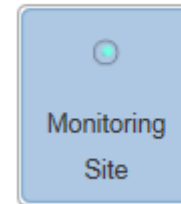
LM0190AH Milford Boat Ramp 07052016.jpg(X)

Add: 

 Save  Delete  Undo

4. A Green box will appear in the upper right hand when the Point is added or updated. Click the Refresh button if you need to add attachements.

1. Select A Template:



Basemaps

Feature Updated

The feature was updated successfully.

Algae Database

Generating Data: After performing taxonomic identifications and absolute cell counts, the algal taxonomist uses a stand alone MExcel software spreadsheet with built in macros (described in the KDHE Lake and Wetland Monitoring Program's Quality Assurance Management Plan; see "Form LW-5") to calculate derived metrics such as percent bluegreens, percent greens, and biovolumes. Toxin analysis results and chlorophyll-a analysis results may also be entered into this same spreadsheet.

Entering Data: Once there is a header for the Sample Site, the actual data can be entered into Oracle's Algae database; again, logon needs to be authorized by IT.

1. Logon to Oracle has to be authorized by IT:

http://kdhenet/KDHEoracle_apps_gallery.htm



Surface Water Quality Analysis

[... \(oraforms\SC\SCMAINMENU.fmx\)](#)

2. Type in 'Site Name' and hit 'Enter'
3. Click on 'Add New'

Select Site Name:

Current Site Name: **2.**

Location:

Click a Col Date (collection date) to view that entire sample

Site Name	Col Date	TIME	DPTH	ELISA	%BlueGreens		
LM0697AA	20110627	1055	00.1	.50	78.4	X	<div>scroll up</div> <div>scroll down</div> <div>refresh</div> <div>add new</div>
LM0697AA	20110725	1155	00.1	.50	.0	X	
LM0697AA	20110822	1055	00.1	.50	.0	X	
LM0697AA	20120514	1315	00.1	.50	88.8	X	
LM0697AA	20120611	1405	00.1	30.00	99.1	X	
LM0697AA	20120618	0955	00.1	.50	69.5	X	
LM0697AA	20120625	0925	00.1	.50	86.1	X	
LM0697AA	20120709	0955	00.1	.50	67.4	X	
LM0697AA	20140527	1320	00.1	.50	99.8	X	
LM0697AA	20140610	0825	00.1	.50	98.5	X	
LM0697AA	20140623	1204	00.1	.50	48.8	X	
LM0697AA	20140707	1202	00.1	.50	6.2	X	
						X	
						X	
						X	
						X	

4. This will bring up a blank page to which the new information for the site can be added.

Oracle Developer Forms Runtime - Web

Back Print Window

KOHE Sample Form

Site Name Collect Date Time Depth

<input type="checkbox"/> Total cell count (cells/ml)	<input type="checkbox"/> Microcystis cell count (cells/mL)
<input type="checkbox"/> % tot cell count in Chlorophytes(greens)	<input type="checkbox"/> Woronichinia cell count (cells/mL)
<input type="checkbox"/> % tot cell count in cyanophytes(blue-greens)	<input type="checkbox"/> Coelosphaerium cell count (cells/mL)
<input type="checkbox"/> % tot cell count in Diatoms/Chrysophytes	<input type="checkbox"/> Planktothrix cell count(cells/mL)
<input type="checkbox"/> % tot cell count in Dinoflagellates	<input type="checkbox"/> Cylindrospermopsis cell count (cells/mL)
<input type="checkbox"/> % tot cell count in Cryptophytes	<input type="checkbox"/> Aphanizomenon cell count (cells/mL)
<input type="checkbox"/> % tot cell count in Euglenophytes	<input type="checkbox"/> Anabaena cell count (cells/mL)
<input type="checkbox"/> % tot cell count in Other	<input type="checkbox"/> Anabaenopsis cell count (cells/mL)
<input type="checkbox"/> Total biovolume (ppm)	<input type="checkbox"/> Misc./Other blue-greens (cells/mL)
<input type="checkbox"/> % tot biovolume in Chlorophytes (greens)	<input type="checkbox"/> ELISA microcystins (ug/L)
<input type="checkbox"/> % tot biovolume in cyanophytes (blue-greens)	<input type="checkbox"/> microcystin LR (ug/L)
<input type="checkbox"/> % tot biovolume in Diatoms/Chrysophytes	<input type="checkbox"/> microcystin LA (ug/L)
<input type="checkbox"/> % tot biovolume in Dinoflagellates	<input type="checkbox"/> microcystin LF (ug/L)
<input type="checkbox"/> % tot biovolume in Cryptophytes	<input type="checkbox"/> microcystin LW (ug/L)
<input type="checkbox"/> % tot biovolume in Euglenophytes	<input type="checkbox"/> microcystin LY (ug/L)
<input type="checkbox"/> % tot biovolume in Other	<input type="checkbox"/> microcystin RR (ug/L)
	<input type="checkbox"/> microcystin YR (ug/L)
	<input type="checkbox"/> anatoxin-a (ug/L)
	<input type="checkbox"/> cylindrospermopsin (ug/L)
	<input type="checkbox"/> Saxitoxins (ug/L)
	<input type="checkbox"/> Geosmin (ug/L)
	<input type="checkbox"/> Methylisoborneol (ug/L)

From the lab sheets, obtain the following information to be entered:

- Site Name (Required)
- Collection Date (Required)
- Time sample was collected (Required)
- Depth of sample (Depth is 00.1 m for all algal data, required field)

- e. Total cell count
- f. % Greens, Blue-greens, etc.
- g. Total biovolume
- h. % total biovolume in greens, blue-greens, etc.
- i. Microcystis cell count
- j. ELISA Microcystins
- k. Cylindrospermopsin (if required)
- l. Click on 'Save' when finished

KDHE Sample Form

Site Name **LM0697AA** Collect Date **20140707** Time **1202** Depth **00.1**

e. →	25,515	Total cell count (cells/ml)	1,575	Microcystis cell count (cells/mL) ← i.
	47.2	% tot cell count in Chlorophytes(greens)		Woronichinia cell count (cells/mL)
f. {	6.2	% tot cell count in cyanophytes(blue-greens)		Coelosphaerium cell count (cells/mL)
	31.4	% tot cell count in Diatoms/Chrysophytes		Planktothrix cell count(cells/mL)
	.0	% tot cell count in Dinoflagellates		Cylindrospermopsis cell count (cells/mL)
	3.0	% tot cell count in Cryptophytes		Aphanizomenon cell count (cells/mL)
	12.3	% tot cell count in Euglenophytes		Anabaena cell count (cells/mL)
	.0	% tot cell count in Other		Anabaenopsis cell count (cells/mL)
g. →	32,139	Total biovolume (ppm)	.50	ELISA microcystins (ug/L) ← j.
	14.2	% tot biovolume in Chlorophytes (greens)		microcystin LR (ug/L)
h. {	1.0	% tot biovolume in cyanophytes (blue-greens)		microcystin LA (ug/L)
	39.4	% tot biovolume in Diatoms/Chrysophytes		microcystin LF (ug/L)
	.0	% tot biovolume in Dinoflagellates		microcystin LW (ug/L)
	2.8	% tot biovolume in Cryptophytes		microcystin LY (ug/L)
	42.6	% tot biovolume in Euglenophytes		microcystin RR (ug/L)
	.0	% tot biovolume in Other		microcystin YR (ug/L)
				anatoxin-a (ug/L)
				cylindrospermopsin (ug/L) ← k.
				Saxitoxins (ug/L)
				Geosmin (ug/L)
				Methylisoborneol (ug/L)
				Save

The data can be retrieved from the Algae database located in Oracle/Environment. The algal data on Oracle is automatically linked to the KDHE Harmful Algae Bloom Management System application, where it can be viewed/downloaded.

REFERENCE: KDHE 2017. Division of Environment, Quality Management Plan Part III: Lake and Wetland Monitoring Program (Revision 5), 103 pp.

KDHE HARMFUL ALGAE BLOOM MANAGEMENT SYSTEM PROCEDURE (DM-003)

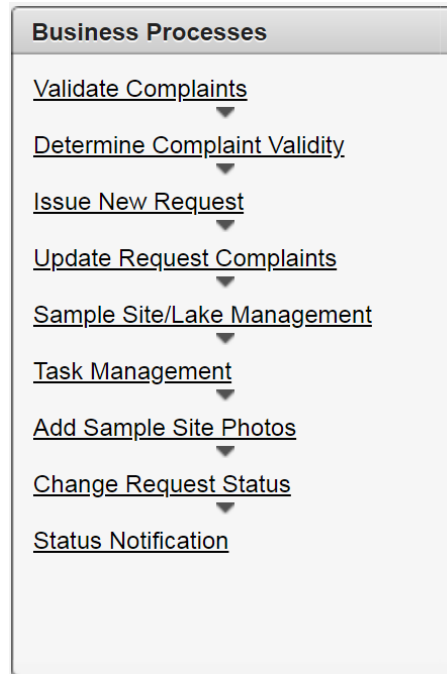
Summary

The HAB Tracking System receives complaints from the public-facing, online reporting form system. If a HAB complaint arrives via email or phone call, BOW-WMPAS staff initiate the process by submitting a complaint form on behalf of the individual who called or emailed.

Next, we determine whether the HAB complaint is valid. For example, if a member of the public enters a complaint for a private pond, we will mark the complaint as “invalid” and may contact the individual to redirect them elsewhere for assistance. Or, the complaint may not contain convincing evidence that a full scale analysis is warranted (e.g., there is a photograph of slightly green water, but it’s difficult to tell whether it represents a HAB event). In the latter case, BOW-WPMAS staff may request additional evidence (in the form of a jar test) from the complainant or the lake manager.

If the complaint is considered valid, the HAB sampling procedure will be initiated. The event nomenclature for the HAB Tracking Application is for an individual waterbody to receive a “Request,” which is then followed by a “Task” for each sampling event. As long as a lake is in an active bloom, only one “Request” is required. Once a sampling task has been initiated, it must go through the whole process (from issuing the sampling task to changing the status of the “Request” based on the sampled data) before another sampling task can be issued. The “Request” will disappear only when the advisory status for that waterbody is updated to “Below Watch.” In general, the user must keep in mind that the HAB Tracking Application has minimal error trapping and is not equipped to deal with typos or discrepancies between records. For example, if sample stations are labeled incorrectly in the Algal Database, or if times/dates do not match, then the record won’t be imported into the HAB Tracking Application. Make sure that dates and times are entered in the correct format, etc.

Most operations will occur in the “Business Processes” Menu, in the upper right-hand corner of the main screen.



After a HAB complaint is received:

Step 1: Check to see if the lake has an assigned number

Before starting the process, it is helpful to make sure that the lake in question has a lake number and HAB sample locations- this can be verified directly in Oracle ENVI, or through the ***Sample Site/Lake Management*** screen. (*NOTE- if the “Sample Site / Lake Management screen is blank, computer support staff will need to give permissions for access). All lakes with a number assigned in Oracle will appear in the dropdown menu, even if they’ve never been sampled for HABs. All zoned lakes will have the nomenclature “LM(zone letter)(lake number without leading 0).” For example, Perry Lake Zone A is: LMA290. If the given lake does not appear in the dropdown list, proceed to the next step to add a lake to the HAB tracking system.

Select Lake for Sampling Points

Home Task Management

Waterbody Id - Select Lake -

Add Sample

Open BGA Map Editor

Add New Lake

Open BGA Map Editor

- Select Lake -
- ALMA CITY LAKE - LM0500
- ALTAMONT CITY MAIN LAKE - LM0680**
- ALTAMONT CITY WEST LAKE - LM0682
- ANTELOPE LAKE - LM0695
- ANTHONY CITY LAKE - LM0488
- ANTIOCH PARK LAKES - LM0677
- ANTIOCH PARK LAKES - LM0677
- ATCHISON CO. STATE FISHING LAKE - LM0126
- ATCHISON COUNTY PARK LAKE - LM0606
- ATWOOD TOWNSHIP LAKE - LM0712
- AUGUSTA CITY LAKE - LM0400
- AUGUSTA SANTA FE LAKE - LM0416
- BAKER WETLANDS - LM0144
- BANNER CREEK LAKE - LM0320
- BARBER CO. STATE FISHING LAKE - LM0131
- BARTLETT CITY LAKE - LM0454

Step 1.1 Adding a lake to the system

Before assigning a number to a lake, it is important to check with the Lake and Wetland Monitoring Program Staff, who are responsible for assigning them. This ensures that numbers are neither skipped nor duplicated.

Once a new lake number is established, open the **Sample Site/Lake Management** screen. Underneath “Add New Lake and Sample Site,” click on the “Open BGA Map Editor” button.

Select Lake for Sampling Points

Home

Task Management

Waterbody Id - Select Lake -

Add Sample Site to Existing Selected Lake

Open BGA Map Editor

Add New Lake and Sample Site

Open BGA Map Editor

Navigate to the lake location with the search bar and select “Add Polygon Feature.” Outline the lake’s shape, then fill in the fields below “Edit Attributes.”

Editor

1. Select A Template:

Monitoring Site

HAB Lake Area

HAB Lake Centroid

2a. Add A New Feature(s):

Add Polygon Feature

Add Point Using Lat/Long

2b. Or Select Existing Feature(s) to Edit:

Select By Rectangle

3. Edit Attributes:

LAKE NAME IN CAPS

County

Lake ID LMabcd

Collected By

Add

GoTo Legal Description

Search

Layers

38.949457 -95.263309

The screenshot shows the 'Editor' window with the following sections:

- 1. Select A Template:** Three options are shown: 'Monitoring Site' (green dot), 'HAB Lake Area' (blue polygon, selected), and 'HAB Lake Centroid' (red triangle).
- 2a. Add A New Feature:** Two buttons: 'Add Polygon Feature' and 'Add Point Using Lat/Long'.
- 2b. Or Select Existing Feature(s) to Edit:** One button: 'Select By Rectangle'.
- 3. Edit Attributes:** A form with fields:
 - LAKE NAME IN CAPS:** WEST CAMPUS LAKE KU (highlighted with a red box and callout 1)
 - County:** DOUGLAS (dropdown menu)
 - Lake ID:** LM0762 (text input field)
 - Collected By:** (empty text input field)

At the bottom left, there is an 'Add' button with a plus icon, highlighted with a red box and callout 2.

Select the “Add” button. The words “Feature added!” will appear on the map if everything worked correctly.

Step 2: Check to see if there are HAB sample sites

If a new lake number was required, it has not been sampled for HABs before. However, if the lake was already in the system, check to see whether it has been sampled for HABs before. As soon as the lake has a number in Oracle, it will be visible in the **Sample Site/Lake Management** (under the “Business Processes” menu). Select the lake, click on “Open BGA Map Editor,” and wait for the map to appear; it may take a few seconds. The map will have all sample locations marked. All HAB recreation sample sites are designated by the convention “AA,” “AB,” “AC,” and so on. All HAB PWS sample sites are designated by the convention “BA,” “BB,” and so on. If the lake has a site designated, go on to Step 3: Validate visual description of complaint.

Select Lake for Sampling Points

Home

Task Management

Waterbody Id WEST CAMPUS LAKE KU - LM0762

Add Sample Site to Existing Selected Lake

Open BGA Map Editor

Add New Lake and Sample Site

Open BGA Map Editor

Step 2.1: Adding a HAB sample site

Open a map of the lake in the **Sample Site/Lake Management** screen. Click on “Monitoring Site” under “1. Select a Template” on the left-hand side.

Editor

1. Select A Template:

Monitoring Site

HAB Lake Area

HAB Lake Centroid

2a. Add A New Feature:

Add Polygon Feature

Add Point Using Lat/Long

2b. Or Select Existing Feature(s) to Edit:

Select By Rectangle

3. Edit Attributes:

LAKE NAME IN CAPS WEST CAMPUS LAKE KU

County DOUGLAS

Lake ID LM0762

Collected By MEGAN.MAKSIMOWICZ

Save

Delete

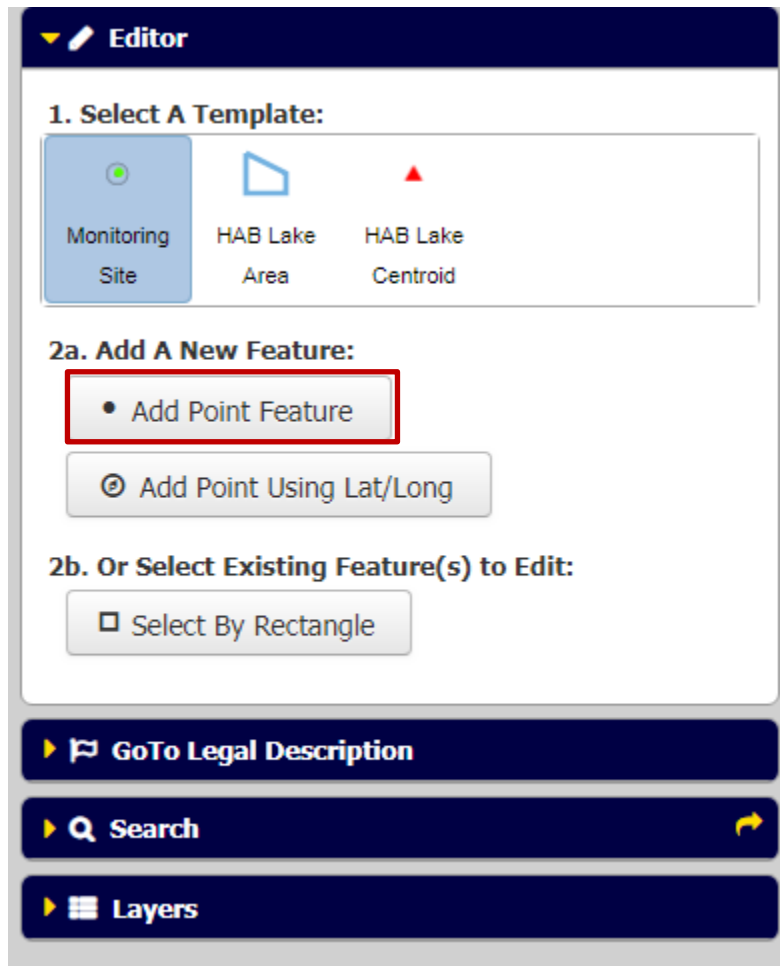
Undo

GoTo Legal Description

Search

Layers

The menu will change. Select “Add Point Feature,” unless measured coordinates (latitude and longitude) are available.



Select the sample site location on the map (based on primary contact locations, e.g., a swim beach – discuss with HAB group first).

Editor

1. Select A Template:

Monitoring Site

HAB Lake Area

HAB Lake Centroid

2a. Add A New Feature:

☐ Add Point Feature

☒ Add Point Using Lat/Long

2b. Or Select Existing Feature(s) to Edit:

☐ Select By Rectangle

3. Edit Attributes:

Sample Site ID

LM0762AA

Program Code

LM

Program Name

Harmful Algae Blooms

Water Source Name

West Campus Lake KU

Water Source Type

LAKE/POND

Site Use

HAB only

SC Site Type/Status

LM Site Type/Status

Site Feature Type

SHORELINE

On Water Register?

No

For HAB Sample?

Yes

County

DOUGLAS

HUC 12

102701040202

Alias Site Name

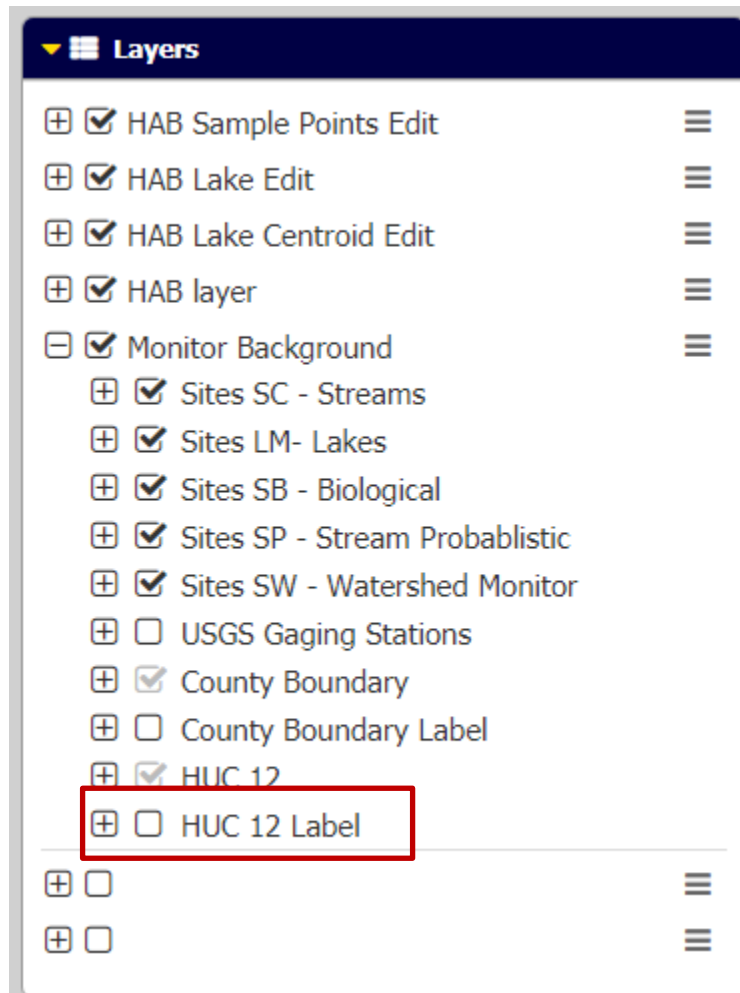
Murry's Lake

Location Descrip

Comments

Be sure to include the site letters- No spaces before or after!

Fill out the attributes for that specific location. The HUC 12 label can be found on the “Monitor Background” dropdown, under the “Layers” dropdown, located at the very bottom of the editor toolbar.



When all the attributes are entered, click on the “Add” button at the bottom of the attributes box. When a sample site is successfully added, it will appear on the map with the words “Feature Added!”

Step 3.1: Validate visual description of complaint.

There are two components to validation of a complaint. The first component is based on narrative description or a visual, and the second component is if further validation is required using the jar test method. If a complaint is received by a lake manager or other professional who have a good working knowledge of HAB, it is often advanced in the system without a request for further data. The jar test validation is most often used in cases where the

reliability of the complainant is unknown or it is difficult to tell, from field photographs, if a cyanobacterial bloom is present. Both components must be completed in the HAB Tracking Application to fully validate a complaint.

For the first validation, select **Validate Complaints** under the Business Processes Menu. Select “Edit” for the complaint in question.

Unvalidated Complaints									
Home Continue Validation									
Edit	Submit Date	Proxy Submission	Submitter Name	Reporting Name	Waterbody (WB)	WB Location	WB County	Observed Date	Description
Edit	8/3/2018	Yes	Chris Steffen, KDWPT ANS Coordinator	Chris Steffen	Caney River	37 00'10"N 96 18'50"W Just west of Elgin, Kansas	chautauqua	8/3/2018	Red colored algae thick on surface of river. Has been present for a week or more. I have pictures I can send if you want them.
Edit	9/27/2018	No	Ted Harris, Kansas Biological Survey	Ted Harris	KU West Campus Pond (AKA Murry's pond)	38.949457, -95.263309 (West Campus of KU)	Douglas	9/27/2018	Surface scum of cyanobacteria comprised of Anabaena, Oscillatoria, and Woronichinia

This will bring up the following menu:

3 [Save Validation](#)

1

Select Lake -

2

Jar Test Requested

Select

Complaint Record Id 636692791101363750

Waterbody Id

Complaint Validation No

Waterbody Name

Jar Test Requested

Comments

Clear Selection

First, select “Waterbody Id” from the dropdown menu. This will change the “Complaint Validation” section to say “Yes,” and the “Jar Test Requested” dropdown will then be active. Select “Yes” or “No” for the Jar Test Requested, depending on whether one is required. This will send out an email to the HAB Team listserv that there has or has not been a jar test requested, so it is helpful to add comments here - (Example: If a jar test has already come in, the user can say “Yes” for the request, but add a comment to specify that the test has actually been completed already, and results were already submitted.)

Step 3.2: Invalidate Complaint

Alternatively, if the complaint is not valid, select “Save Validation” and do not fill out any other information. This will mark the complaint as invalid, and it will not appear again.

Validate Selected Complaint

1 **Save Validation**

Complaint Record Id 636692791101363750

Waterbody Id **- Select Lake -** Waterbody Name

Complaint Validation Jar Test Requested **Select**

Comments

Clear Selection

Step 4: Validate Jar Test

After the initial visual validation is saved, the complaint will now appear under **Determine Complaint Validity**, on the Business Processes menu. Again, select “Edit” for the complaint in question.

List for Final Validation

	Complaint Id	Lake ID	Lake Name	Initial Validation	Validated By	Validation Comments	Jar Test Requested
Edit	636736673730542500	LM0762	WEST CAMPUS LAKE KU	Yes	MEGAN.MAKSIMOWICZ		No

1 - 1

Final Complaint Validation

5 **Confirm Validation** **Deny Validation** **Save Complaint**

***Complaint ID** 636736673730542500

***Initial Complaint Validation** Yes

Complaint Validated By MEGAN.MAKSIMOWICZ

Lake ID LM0762

Lake Name WEST CAMPUS LAKE KU

Jar Test Received 10/27/2018

Jar Test Result 2 **Positive**

3 **Validation Comments** Jar test done, but initial microscope look from Ted validates presence of BG

Jar Test Requested No

Create New Request for Sampling 4 **Yes**

First, select the date using the calendar icon to the right of “Jar Test Received.” Select a date, even if no actual jar test was done (for example, if the complaint was submitted by an experienced professional, and/or convincing photographic documentation was provided).

IMPORTANT: In order for the “Confirm validation” button to become active, the jar test results *must* be marked as “Positive.” If no jar test was conducted, just enter an explanation under “Validation Comments.”

Change the “Y” to “Yes” under “Create New Request for Sampling.” Then select “Confirm Validation.”

Step 5: Use validated complaint to create a new request, or attach validated complaint to existing request

Once it has been determined that at least one sample will be needed from a given lake, the first task is to set up the “Request.” This can be thought of as the way the application tracks the status of the whole lake. Once a Request has been opened, then “Tasks” can be assigned to sample. The waterbody-specific “Request” only needs to be initiated once for each active bloom, and that Request will then be updated with the waterbody’s advisory status (*i.e.*, Watch, Warning, Below Watch) each time a sample is submitted.

To initiate the request, click on Issue ***New Request*** under the “Business Processes” menu. After the complaint has been validated for the jar test, it will appear under the “Validated Complaints” screen.

Step 5.1 (for a new request)

If this is the first Request for a lake, select the lake from the “Lake ID” dropdown menu (otherwise, please refer to Step 5.B for an existing request). After the lake is selected, click on the “Save New Request and Associate Complaints” button. All validated complaints will appear on the menu.

Validated Complaints

View Record	Observation Date	Observer Lake Name	KDHE Lake Name	Observers Description
	9/27/2018	KU West Campus Pond (AKA Murry's pond)	LM0762 - WEST CAMPUS LAKE KU	Surface scum of cyanobacteria comprised of Anabaena, Oscillatoria, and Woronichinia

1 - 1

Select Lake for New Request

Home **Save New Request and Associate Complaints**

Lake ID Observations

Active Requests

Associate Complaints with Existing Requests

Request ID	Lake ID	Lake NAME	Status	Complaints
302	LM0120	WEBSTER LAKE	Warning	1
306	LM0608	CARBONDALE WEST LAKE	Warning	1
307	LM0271	MELVERN OUTLET POND	Warning	3
309	LM0272	MELVERN OUTLET SWIM POND	Warning	1
311	LM0606	ATCHISON COUNTY PARK LAKE	Warning	1
313	LM0760	JERRY IVEY POND	Pending	1

Select Complaints

< Previous

Request Id 341

Waterbody Name WEST CAMPUS LAKE KU

Request: 341

Lake ID: LM0762

Lake Name: WEST CAMPUS LAKE KU

KDHE Lake	Complaint Lake	Observed Date	
LM0762 - WEST CAMPUS LAKE KU	KU West Campus Pond (AKA Murry's pond)	9/27/2018	Add

Complaints related to a Request

Select the “Add” button on the complaint that matches the given lake. This will populate the “Complaints related to a Request” column, and a “Save” button will appear.

Select Complaints

< Previous **Save**

Request Id 341

Waterbody Name WEST CAMPUS LAKE KU

Request: 341

Lake ID: LM0762

Lake Name: WEST CAMPUS LAKE KU

KDHE Lake	Complaint Lake	Observed Date	
LM0762 - WEST CAMPUS LAKE KU	KU West Campus Pond (AKA Murry's pond)	9/27/2018	Add

Complaints related to a Request

Remove LM0762 - WEST CAMPUS LAKE KU

Click “Save.” This will send an email to the HAB Team listserv that a new sampling request has been issued.

Then a new screen will appear, with a button for “Home” and a button for “Warning Status Update.” The “Warning Status Update” is for instances in which the HAB Team knows, based on professional reports or convincing photographic evidence, that the lake in question is already in the midst of an extreme bloom, and they wish to change the status without first sampling. This screen may also be used to “Create Another Request” for complaints for other lakes, or to “Associate Complaints with Existing Request” if there are multiple complaints for the same lake.

In most instances, just select the “Home” button, and move on to issuing a sampling task.

Request Summary --- Set to Warning Status

Home Warning Status Update

Request: 340

Lake ID: LM0126

Lake Name: ATCHISON CO. STATE FISHING LAKE

Request Number	Lake ID	Lake Name	Complaint Name	Complaint Waterbody
341	LM0762	WEST CAMPUS LAKE KU	Ted Harris	KU West Campus Pond

1 - 1

Create Another Request Associate Complaints with Existing Request

Step 5.2 (for an existing request)

If there is already an active request for a lake, it will not appear on the dropdown menu. Instead, select the “Associate Complaints with Existing Requests” button. Select the “Edit” button next to the lake with the complaint. This screen should have all of the available validated complaints to add to the request, but this may not be updated immediately. (Ask a coworker to login to double check this task under his/her login, if known complaints do not appear on this screen as expected.)

Step 6: Issue a sampling task

For all of the steps dealing with an individual sampling task, the user will keep returning to the **Task Management** link on the “Business Processes” screen. The menu will be separated into two sections – “Request with no task” and “Request with assigned tasks.”

The new request will fall under the first section, “Request with no task.” Note that if there are more than 15 records, the user may have to select the Next arrow at the bottom of the section to see more requests. They are not necessarily in alphabetical order.

Home

Request with no task

Create Task	Request No.	Lake Id	Lake Name	Request Status	Task No.	Task Count
Edit	338	LM0417	TOMAHAWK PARK LAKES	Pending	-	0
Edit	340	LM0126	ATCHISON CO. STATE FISHING LAKE	Watch	1113	1
Edit	341	LM0762	WEST CAMPUS LAKE KU	Pending	-	0

Previous 16 - 18

Select the “Edit” button next to the lake where sampling is needed. Before completing this step, **make sure that all of expected sampling locations exist in the “Sampling Site/Lake Management” map and are correctly labeled.**

Selecting “Edit” will pull up the following screen.

Task Entry Form

Home [Save Task](#) 4

Request Id 340

Task No.

Assigned To 1 Select Field Unit -- ▾

Fieldwork Due Date: 2

Sampling Instructions 3 No special instructions.

First, select from the dropdown menu which Field Unit will collect the sample. Field Unit can be determined using the District map located at: http://www.kdheks.gov/befs/dist_office.html. Most lakes fall within one district’s jurisdiction; however, some lakes require special treatment; consult the HAB Team manager if there is any question. Other monitoring crews may sample when it falls into their regular sampling schedule, but for the most part, it will go to the District Office.

Next, select the calendar next to the “Fieldwork Due Date,” and select the date (usually the Monday of the new sampling week).

In the “Sampling Instructions” box, it is helpful to fill out any info for PWS sampling information, or to let District Offices know of any special information.

After this screen is complete, select the “Save Task” button.

Request - Task Details

Home < Task Management Reports

Task No.	Request No.	Waterbody Id	Lake Name	Group Assigned	Completion Target Date	Completion Date
1130	341	LM0762	WEST CAMPUS LAKE KU	NE	10/1/2018	-

1 - 1

Update Sample Site List

NE

<input type="checkbox"/>	Task No.	Request No.	Sample Site Name
No data found.			

Add Row for Sample Site

Delete Sample Entries Save Sample Entries

Open Report on Completed Sampling

This will pull up a new screen, which is only accessible after the “Save Task” button has been hit. This is why it’s important to have the sampling site locations correct before this point. If they are incorrectly labeled or nonexistent, they will not be selectable at this time, and the sampling task will be irretrievable by the user; it cannot be advanced, deleted, or overwritten. If this happens, the user must contact computer support staff to delete the record, fix the sampling site error, and then resubmit the sampling task.

To add sampling sites, select the button for “Add Row for Sample Site.”

Request - Task Details

Home < Task Management Reports

Task No.	Request No.	Waterbody Id	Lake Name	Group Assigned	Completion Target Date	Completion Date
1130	341	LM0762	WEST CAMPUS LAKE KU	NE	10/1/2018	-

1 - 1

Update Sample Site List

NE

<input type="checkbox"/>	Task No.	Request No.	Sample Site Name
<input type="checkbox"/>	1130	341	WEST CAMPUS LAKE KU - AA ▼

Add Row for Sample Site

Delete Sample Entries Save Sample Entries

Open Report on Completed Sampling

Click only after all sample sites are added!

This will bring up a drop down menu, where one sampling site can be selected. Select sites from the dropdown menu. In smaller lakes, often only one sample is required, typically the “AA” site. If samples are needed from more than one location, add a row for each site using the “Add Row for Sample Site” button, and populate each row with a different site location.

When all of the sample site locations are selected, click on the “Save Sample Entries” button. The “Save Sample Entries” button will then be replaced with an “Email” button. Click on the Email button, which will automatically populate with the email addresses of the selected Field Unit*, as well as any special instructions you’ve already filled out.

*The email addresses can be updated/edited through the “Manage Sampling Crews” button under the “Application Administration” menu on the lower right of the main screen.

Request - Task Details

Home < Task Management Reports

Task No.	Request No.	Waterbody Id	Lake Name
1130	341	LM0762	WEST CAMPUS LAKE KU

Update Sample Site List

NE

<input type="checkbox"/>	Task No.	Request No.	Sample Site Name
<input type="checkbox"/>	1130	341	WEST CAMPUS LAKE KU - AA ▼

1 - 1

Add Row for Sample Site

Delete Sample Entries **Email**

Open Report on Completed Sampling

Task Email

< Task Management **Send**

Task Id 1130

Group Abbreviation NE

Sampling Group Email Helen.Holm@ks.gov,Brian.D'Alfonso@

Request No 341

Lake Id LM0762

Lake Name WEST CAMPUS LAKE KU

Task Detail

No special instructions.

Target Completion Date 10/1/2018

Sample Site Name(s) LM0762AA

Water Body County DOUGLAS

Click “Send.” Now, wait until samples are received from the District Office or other sampling crew.

Step 7: Update task with completion of fieldwork

Once the sample/s are received, click on **Task Management** under the Businesses Processes menu. The lake will appear on the lower menu entitled “Request with assigned tasks.”

Request with assigned tasks							
Update Task	Task No.	Request No.	Lake ID	Lake Name	Request Status	Site Count	Fieldwork Due Date
Edit	993	313	LM0760	JERRY IVEY POND	Pending	0	7/9/2018
Edit	1113	340	LM0126	ATCHISON CO. STATE FISHING LAKE	Pending	1	9/17/2018

1 - 2

Once the sample results have been entered into the Algae Database by the analytical staff, select “Edit” next to the lake in question. It is possible to do this step before the sample results have been entered, but it is better to wait and double check the data entry with the entries in the Oracle Algae database. The data will be pulled in to the HAB Tracking Application as soon as a sample with the same sample name and time is entered into the Oracle database.

This will bring up the following screen:

Update Task Entry Form

[Home](#)
[< Previous](#)
[Update Task](#)
[Warning Status Update](#)

Request Id 340
Task No. 1113
Assigned To: NE
Fieldwork Due Date: 9/17/2018
Sampling Sites: LM0126AA

Sampling Instructions

Fieldwork Completed (Date)

Fieldwork Comments:

Waterbody Id

Select the calendar next to “Fieldwork Completed (Date),” and select the date that fieldwork was completed. Then select “Update Task.” (This is another location where the user can skip data, and simply select “Warning Status Update.” This is rare, but useful to know in cases where the HAB Team staff are certain that the lake is in very bad condition, but haven’t been able to test it yet.)

After “Update Task” is selected, the following screen will appear:

Request - Task Details

Home < Task Management Reports

Task No.	Request No.	Waterbody Id	Lake Name	Group Assigned	Completion Target Date	Completion Date
1113	340	LM0126	ATCHISON CO. STATE FISHING LAKE	NE	9/17/2018	9/17/2018

1 - 1

Update Sample Site List

LM0126

<input type="checkbox"/>	Task No.	Request No.	Sample Site Name	Sample Collection Date	Sample Collection Time	Sample Depth (m)
<input type="checkbox"/>	1113	340	LM0126AA			00.1 ▼

1 - 1

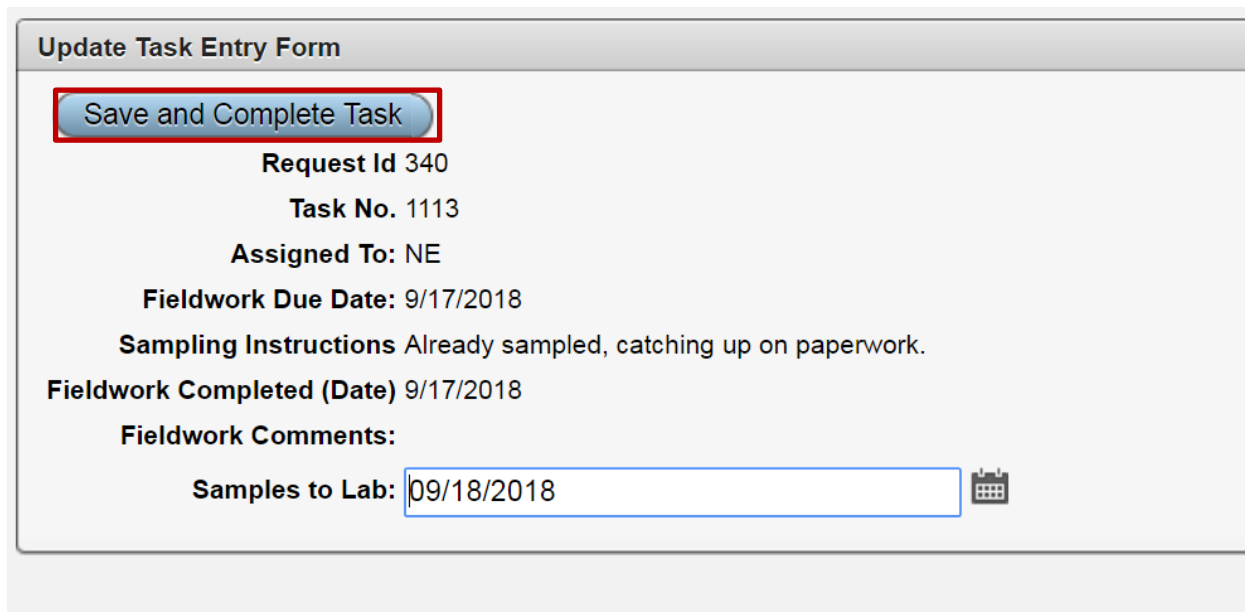
Add Row for Sample Site

Delete Sample Entries Save Sample Entries Open Report on Completed Sampling

Click only after all sample site times are added!

It is very important to get the sample date and time correct for each sample site. As soon as a sample with the same header information is entered into Oracle, the data will be imported into the HAB Tracking Application. **Enter all times in military time, and with 4 digits (e.g., 0940 for 9:40 AM and 1340 for 1:40 PM).** (Dates and times can easily be corrected in the Oracle Algae database, but they cannot be corrected in the HAB Tracking Application. If the user makes a data entry mistake here, computer support staff will have to delete the record so that date/time can be re-entered.

When this step is complete, click on the button for “Save Sample Entries.”



Update Task Entry Form

Save and Complete Task

Request Id 340

Task No. 1113


Assigned To: NE

Fieldwork Due Date: 9/17/2018

Sampling Instructions Already sampled, catching up on paperwork.

Fieldwork Completed (Date) 9/17/2018

Fieldwork Comments:

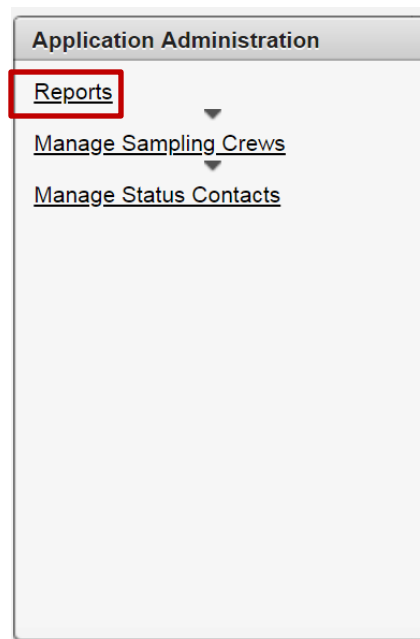
Samples to Lab: 09/18/2018 

A new screen appears, which automatically populates the “Samples to Lab” with the day after field work is complete. This date is not as consequential - it’s not connected to data or other key components of the HAB Tracking Application. Click on the “Save and Complete Task” button. The request will no longer appear on the Task Management menus (either “Request with no task” or “Request with assigned tasks”).

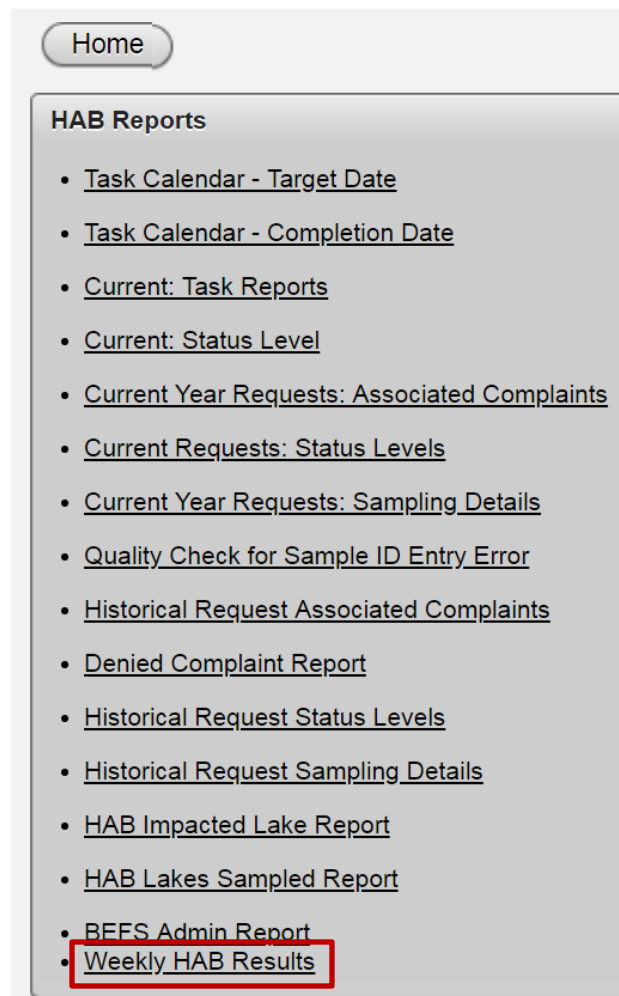
If the date, time, and sample site name match between Oracle and the HAB Tracking Application, then as soon as the data is entered in Oracle, it should be visible in the reports generated within the HAB Tracking Application.

Step 8: View data

This is one instance where we the desired screen is NOT accessed through the “Business Processes” menu. Instead, click on “Reports” under the **Application Administration** menu on the lower right of the main menu.



There are a variety of reports that are generated, but the one used to view the most recent data is the “Weekly HAB Results” at the very bottom of the HAB Reports screen.



There are many ways to see the desired data. The user can filter through the “Actions” dropdown menu, or select “Date Collected” and click on the “Sort Descending” arrow. If the HAB Tracking Application correctly pulled information from Oracle, all dashes will be replaced by data.

Step 9: Update Request Status

After viewing the data and conferring with the people in the weekly stakeholder meeting, update the request status. This can be done through the link to ***Change Request Status*** on the Business Processes menu. **This will update the HAB map online, so make sure that this occurs immediately after the weekly stakeholder meeting.**

Report of Requests to be Reviewed for Status Change

Home

Change Status	Request No	Task No	Lake ID	Lake Name	Current Status	Lake Sample Sites	Lake Sample Results	Recommended Status
Edit	340	1113	LM0126	ATCHISON CO. STATE FISHING LAKE	Pending	1	1	Watch

1 - 1

All requests that have data will be available on this menu, along with the recommended status. Select the “Edit” button next to the lake in question. This will bring up the following screen:

Request Status Log

Request No	Task No	Status	Status Date
340		Pending	9/21/2018

1 - 1

Update Status

Home < Previous **Update Status**

Request No. 340

Task Id 1113

Lake ID LM0126

Lake Name ATCHISON CO. STATE FISHING LAKE

Lake Samples 1

Select the “Update Status” button. The following screen will appear:

Task Id	Ss Items Id	Ssite	Sample Id	Cctot	Ptcccyano	Ccyano Cnt	Mcelisa	Cnt Status	Elisa Status	Sample Status	Cause
1113	2017	LM0126AA	LM0126AA20180917111500.1	231336	97.4	225321.264	.5	Watch	Below Watch	Watch	Cell Count

1 - 1

New Request Status


Return to Status Report **3** Save Updated Status

Request No. 340

Task Id 1113

Lake Name **1** HISON CO. STATE FISHING LAKE

Status **1**

Status Announcement Date **2** 

The user can bypass the recommended status and select the agreed upon status under the “Status” dropdown menu. In most cases, the automatically recommended status is used. One example may be a case in which a credible report from a lake manager or District Staff member indicates that a bloom increased in severity greatly after the sampling date, so instead of the “Warning” that the data shows, the HAB Team may opt to use a visual confirmation to elevate to a “Closed” status. At any rate, all exceptions are to be discussed with stakeholders and supervisors first.

Use the calendar next to the “Status Announcement Date” field to select the date (usually the Thursday of the sampling week).

Then select the “Save Updated Status” button.

Step 10: Close a request or resample active HAB lakes

Step 10.1: Closing the request when a bloom has dissipated

If a request is changed to “Below Watch,” it will no longer be an active request.* This request is no longer considered “Active” and will not appear on the “Task Management” menus. If a bloom appears on the same waterbody later in the season, a new complaint will need to be validated, and a new request issued.

*Note on zoned lakes: The HAB Team instituted the “Zone Below Watch” status to make sure that the requests for all of the zones stay active during a bloom. When the bloom is gone, all of the zones have a “Zone Below Watch” status. This does not trigger the HAB Tracking

Application to switch the Requests to inactive. The software does not currently have a mechanism to prevent this. When advisories have been lifted on all zones of a zoned lake, ask computer support staff to change the last status of all of the zones from “Zone Below Watch” to “Below Watch.” This will switch the Request to inactive.

Step 10.2: Send out a task to resample HAB lakes

As soon as a Request is updated with a new advisory status, it will appear on the “Task Management > Request with no task” menu. When it is time to sample the lake again, start from “Step 6: Issue a sampling task” again, and create a sampling task. This process will repeat until the request is updated to “Below Watch” and is no longer considered active.

APPENDIX M

Acronyms

Acronyms

BEFS	Bureau of Environmental Field Services at KDHE
BEH	Bureau of Environmental Health at KDHE
BEPHI	Bureau of Epidemiology and Public Health Informatics at KDHE
BGA	Blue Green Algae
BOW	Bureau of Water at KDHE
CDC	Centers for Disease Control and Prevention
HA	Health Advisories
KDAH	Kansas Department of Agriculture, Division of Animal Health
KDHE	Kansas Department of Health and Environment
KDWPT	Kansas Department of Wildlife, Parks and Tourism
KHEL	Kansas Health and Environmental Laboratories
KSVDL	Kansas State Veterinary Diagnostic Laboratory
LCMS	Liquid Chromatography Mass Spectrometry
OC	KDHE, Secretary's Office
OHHABS	One Health Harmful Algal Bloom System
OIT	Office of Information Technology at KDHE
PIO	Public Information Officer
PWS	Public Water Supply (a local water producer)
PWSS	Public Water Supply Section in BOW at KDHE
USACE	U.S. Army Corps of Engineers
USBR	U.S. Department of Interior, Bureau of Reclamation
WPMAS	Watershed Planning, Monitoring and Assessment Section in BOW at KDHE